

THE RADIO AMATEUR'S LICENSE MANUAL

TO OWN and operate an amateur radio transmitting station in the United States it is necessary to have two licenses, both of which are issued by the Federal Communications Commission, at Washington, D. C. For the operator himself there is the *operator license*, issued after the individual has passed a code test and a written examination designed to test his familiarity with radio law and regulations and his knowledge of the proper operation of amateur transmitting equipment. The holder of an operator license can operate any amateur station, his own or someone else's (subject to the regulations, of course). For the transmitting equipment itself there is the *station license*, which licenses the operation of one particular collection of transmitting equipment at a specified location and also authorizes portable and mobile operation as permitted under the regulations.

It is absolutely essential that both licenses be obtained before an amateur station of any kind is operated. We wish to emphasize this point and, further, to emphasize that there are no exceptions to the requirement for licenses for any of the kind of work an amateur is interested in undertaking. Those who, after study, think that the language of the law is such as to permit of some special interpretation which will enable unlicensed operation under certain conditions are warned that the language of the law is air-tight, and no such special interpretations are possible. Please do not write us, therefore, asking if unlicensed operation isn't all right if the power used is so low that the station won't be heard over the state line, or if licenses are required for 2-meter transceivers, or anything of that sort; you will only be wasting your time and ours. To make it perfectly clear, we will repeat that the only circumstances under which any sort of radio transmitting equipment can be operated without a station license for the equipment and an operator license for the operator involve special apparatus operating over only a few feet under highly complex regulations and having no interest to radio amateurs. If we appear to be stressing this point unduly, it is only because, in spite of all we say, many individuals each year write us asking if licenses are necessary in this special case or that. There are no special cases; licenses are *always* necessary. The loss of future operating privileges as well as the prospect of fine and imprisonment

face the unlicensed operator who is sure *he* is an exception.

There is no age limit for amateurs. However, only American citizens can own and operate amateur stations in the United States. Since aliens possessing first papers are not yet full-fledged citizens, they also are barred from holding licenses.

The Combination Station-Operator License

In its physical form, the amateur license is a white card 3 inches by 5 inches, intended to be trimmed to 2½ by 4 inches. This represents both the station and operator licenses, the station license appearing on one side and the operator license on the reverse side.

Most persons getting licenses intend to have stations of their own and therefore obtain both station and operator licenses. However, a person wishing to get only an operator license can do so; simply state you want the operator license only, and leave blank all portions of the application form with respect to the station-license application. It should be mentioned, though, that it is impossible for an individual to get a station license alone, without at the same time getting an operator license; it is required that a person who wants an amateur station license must also qualify as an amateur operator.

Moreover, only an *amateur* operator may operate amateur stations, and even the holder of a "commercial" must obtain an amateur operator license, in addition, if he wishes to operate an amateur station.

It is not necessary that you *post* your license in your radio room, but it is required that you have it in your personal possession whenever and wherever you are operating.

The Station License

The station-license part of the combined license is the station's "registration." It licenses a collection of apparatus at a particular address (with certain restricted portable and mobile privileges, however) to be operated as an amateur station in the amateur frequency bands. It designates the official call to be used. It is secured by filling in those portions of the combined license-application form which deal particularly with the station-license application. (However, you will not be issued a station license unless you

can say, on the application, that you have the necessary equipment for a station.)

Although the specific prohibition of amateur stations on premises controlled by an alien has been dropped from our rules, you must still be able to show control of the premises where the station or its control point is to be located. If you are an American citizen and own your own home you may have a station there. If you are a citizen, renting the house or apartment where you live, you may have a station there, since your rental of the property brings it under your control. You may have a station in your own office, since you control that; and, even though you be a minor, you may have one in your own home.

The station license should be at hand whenever the station is being operated. If your station is to be operated by someone in your absence, either leave your license at your station or have a photo-copy of the *station* authorization made and post that in your shack.

IMPORTANT: A station may be operated only to the extent of privileges for which *its* licensee is licensed as an operator; i.e., a station owned by a *Class B* or *Class C* licensee may not be operated in the *Class A* bands even though a *Class A* operator is present and in charge of the equipment.

The station license runs concurrently with the operator license and like the latter has a term of five years. It may be renewed, as will be outlined later.

Portable & Mobile Operation

The possession of a station license automatically authorizes you to operate a portable station on any amateur frequency. No notice is required for operation on frequencies above 25 Mc. but if you intend to operate on any amateur band below 25 Mc. you must give advance notice to the FCC inspector in whose district you will be. See §12.92 of the FCC amateur rules in this booklet. Your station license also automatically authorizes mobile operation (on automobiles, boats, airplanes, etc.) on amateur bands above 25 Mc. without advance notice. Mobile operation is not permitted on the bands below 25 Mc. Logs must be kept in all cases, of course, and must show the approximate location at each transmission.

When operating either portable or mobile, be sure to have your combination license with you while operating equipment under your own call. If not operating your own portable equipment, be sure that you have with you either the original combination license for the call under which the portable equipment is being operated, or a photo-copy of the station authorization for that call. This, of course, is in addition to your own original operator license, which you must also have with you. If you have a portable station operating under your call but not

being operated by yourself, see to it that whoever is doing the operating has either your combination license or a photo-copy of the station authorization with him. You should also be sure such operator is licensed and has his own operator license with him, since you are legally responsible for the proper operation of equipment being operated under your call.

Do not operate an unlicensed fixed station under your own call as a "portable," as this constitutes illegal operation. Nor should you operate a licensed fixed station other than your own under your call on a portable basis; your call and your station license apply only to your own station and cannot be used in connection with the fixed station of someone else. In such circumstances, use his call, and see to it that you not only have your own operator license with you but that a photo-copy of his station license, or the license itself, is in the operating room.

Temporary Operation

Portable procedure is ordinarily confined to truly portable apparatus but there are two conditions under which your own fixed station may be operated temporarily in portable status. These are:

(1) While awaiting receipt of modified license after you have moved your station to a new permanent location and asked for modification. See §12.93(a) of the rules. Such operation cannot be continued more than four months nor beyond the license's expiration. You must send *monthly* notification of the circumstances to the radio inspector concerned, as required by §12.92, and must use portable calling procedure as specified in §12.82. See also the discussion under "Modifications."

(2) When, as during a vacation, for instance, you have set up your fixed station at some temporary address but with the intention of returning after a short time to the address specified on your license, or of shortly moving to still another fixed location. See §12.93(b). If you intend to be there longer than four months, you should immediately apply for modification. But if the occupancy is to be for not more than four months you may notify, move, employ the portable indicator, and move again or move back home. Under this rule, only one notification is necessary for any period up to four months at any one location, but you must send this notice not only to the inspector in whose district you will be operating but to FCC at Washington as well, and must send additional such notices when you resume operating back home or move to still another temporary address.

In either of the above cases it is well to state in your letter of notification that you do not refer to the operation of portable equipment but to a move of your fixed station under §12.93(a) or 12.93(b), as the case may be.

Remote Control

While most amateur stations are controlled from the same address at which the transmitter is located, some amateurs desire to control their stations from a remote operating point. As this requires some special precautions, special FCC authority is necessary, each case being considered on its merits. See §12.64 of the rules for the technical conditions necessary for obtaining authority to operate without an operator on duty at the transmitter location. In an initial application for a new station using remote control, your answer to Question 24 of the application form will supply most of the required data, although you may find it desirable to explain some of your arrangements by an accompanying letter. If you are already licensed without remote control, and desire to install same, you must apply for modification of your station license to authorize the changes and to put the data on record through your responses to Question 24.

The Operator License

The operator authorization on the combined license testifies to the holder's ability to operate an amateur station — not only his own station but any amateur station. A person who wishes only an operator license may apply for just it, even if he personally does not own a station, by filling out only those portions of the application form dealing with the operator ticket.

Always have your operator license in your personal possession whenever you are operating. Be sure to take it along with you whenever you are to operate some station other than your own; the station license part of it is no good to you under these circumstances, of course, but you need it for the operator authorization.

Like the station license, with which it is combined and concurrent, the operator license runs for a period of five years.

To determine that the applicant has the requisite ability the Government requires that he pass a written examination (in addition to filling out the application form) to show that he is familiar with simple radio theory, operation and adjustment of basic transmitting equipment, both telegraph and 'phone, and with the essential parts of the radio law and regulations. The written examination is described in detail in the section entitled "Passing the Operator Examination;" the questions and answers in this booklet indicate its nature and scope. It is also required that the applicant demonstrate ability to send and receive International Morse "Continental" code at the rate of thirteen words per minute (five letters to the word, each numeral or punctuation mark counting as two characters). Perfect copy and sending must be accomplished for one minute out of a five-minute test. That the applicant intends to use 'phone rather than telegraphy

does not excuse him from this code test; everybody has to take it.

Learning the code is mostly a matter of practice. Instructions on learning it, on how to handle a key, data on practice sets, etc., are contained both in *Learning the Radiotelegraph Code* (25¢) and in *The Radio Amateur's Handbook* (\$1), obtainable postpaid from American Radio Relay League, West Hartford, Conn.

There are three classes of amateur operator privileges but two of these are substantially identical in effect, so that it is easier to consider that there are two grades. The *Class A* is sometimes referred to as the "unlimited 'phone" license since, in addition to carrying the privileges authorized under the *B* and *C* licenses, it enables the holder to operate 'phone in the two restricted bands 3900–4000 kc. and 14,150–14,250 kc.

The *Class B* and *Class C* licenses do not entitle the holder to operate 'phone in the two restricted bands just noted but do permit him to engage in all other amateur operation. These two classes are identical so far as privileges are concerned, their only difference being that the *Class B* is issued only when the license examination has been taken in the presence of the radio inspector, while the *Class C* is provisional and is issued on the basis of a mail examination. The *Class B* is compulsory for all persons living within 125 miles airline of an office of the Commission or a point where examinations are held quarterly or by appointment (exceptions: Alaska except Juneau; Hawaii except Oahu; Virgin Islands; shut-ins, as noted below; and personnel of the armed forces unable to appear for examination, per §12.21).

Persons living more than 125 miles from an examining point may take the examination by mail and obtain a *Class C* license, which may be renewed indefinitely as long as the licensee remains in a *Class C* area. However, if a *Class C* licensee moves into a *Class B* area (within 125 miles of such an examining point) he must, within four months, appear at an examining point and take the *Class B* examination and code test, or forfeit his *Class C* license. The same thing is true if FCC establishes a new quarterly examining point whose new 125-mile circle includes him. Furthermore, if a *Class C* licensee under any circumstances violates the regulations or otherwise incurs the official displeasure of the FCC, he may be called upon to journey to the nearest examining point, even though it be many hundreds of miles away, to be given the *B* examination, or lose his *Class C* ticket. In any of the above cases, failure of the applicant on the *Class B* examination bars him from ever again being issued a *Class C* license.

Applying for Licenses

This section will be devoted to *Class B* and *Class C* applications; the *Class A* will be treated

later in a separate section preceding the Class A examination questions.

We have just pointed out that anyone living within 125 miles of an office of the Commission or a point where examinations are held quarterly or by appointment must, under the regulations, travel to that point and take the examination under the supervision of the inspector or one of his staff. Let us see what those points are.

There are 59 such examining centers, 56 in continental U. S. and one each in Alaska, Hawaii and Puerto Rico. Of these, 23 are the district administrative offices of FCC, and a list of them appears in a table at the rear of this booklet. Examinations are given frequently at the district offices. They are also quickly available, either on published schedule or by appointment, at the main office of FCC in Washington and at the suboffices at Savannah (branch of Atlanta), Tampa (branch of Miami), San Diego (branch of Los Angeles), Cleveland (branch of Detroit) and Beaumont, Tex. (branch of Galveston); and at the monitoring stations at Allegan, Mich.; Grand Island, Nebr.; and Kingsville, Tex. In addition, examinations are held *quarterly* at the following cities: Birmingham, Charleston, W. Va., Cincinnati, Columbus, Ohio, Corpus Christi, Davenport, Des Moines, Ft. Wayne, Fresno, Grand Rapids, Indianapolis, Little Rock, Memphis, Milwaukee, Nashville, Oklahoma City, Omaha, Pittsburgh, St. Louis, Salt Lake City, San Antonio, Schenectady, Sioux Falls, S. D., Syracuse, N. Y., Tulsa, Williamsport, Pa., and Winston-Salem. An inquiry to the office of the inspector in whose district is located the particular city in which you are interested will bring information on the exact place and date of the examination. See the inside front cover of this booklet for additional information.

Now, if you live within 125 miles *airline* of one of the above 59 examining points (except in Alaska, outside Juneau, or Hawaii outside Oahu, or the Virgin Ids.) you should write or visit the inspector of the district in which you live, asking for an application blank for amateur station and operator license, and the date when examinations will be held in the city at which you wish to appear. Fill out the application form and mail it *back to the inspector's office*, and then appear at the specified time for personal examination. Or, if you are appearing at a district office where there are frequent examinations, simply fill it out and take it with you. First the inspector gives you your code test; if you are successful in passing this you will be given the written exam. After the examination is completed you can go home; the inspector sends all the papers to Washington and if you were satisfactory your combination license comes direct to your home a few weeks later. If, instead of receiving your licenses, you are notified that you failed, you have the privilege of taking the examination again after thirty days

(any number of times, if necessary).

Examinations for both Class A and Class B are also held *twice* a year in the following auxiliary list of cities: Albuquerque, N. M.; Amarillo, Tex.; Bakersfield, Calif.; Bangor, Me.; Billings, Mont.; Bismarck, N. D.; Boise, Idaho; Butte, Mont.; Cumberland, Md.; El Paso, Tex.; Hartford, Conn.; Hilo, T. H.; Jacksonville; Klamath Falls, Ore.; Las Vegas, Nev.; Lihue, T. H.; Mobile; Phoenix, Ariz.; Portland, Me.; Reno; Roanoke, Va.; Salisbury, Md.; Spokane; Tucson; Wichita; Wilmington, N. C. Annual examinations are held at Kaunakakai, Lanai and Wailuku, T. H. Since the Class B examination is thus conveniently available to applicants in those vicinities, they are urged to appear for personal examination. But one is not obliged to qualify for Class B just because one lives within 125 miles of one of the auxiliary cities mentioned in this paragraph, since examinations do not come there quarterly or oftener. If the travel is inconvenient, one may apply for Class C if otherwise eligible.

If you live more than 125 miles *airline* from any of the 59 examining points mentioned earlier (or live in Alaska outside Juneau, or Hawaii outside Oahu, or in the Virgin Ids.), write the inspector of the district in which you live, asking for a *Class C* amateur operator and station application blank, examination, etc. He will send you an application form, a return envelope addressed to FCC at Washington, and a sealed envelope containing a set of examination questions, and instructions thereon. *Before doing anything else, read the instructions carefully.*

Now, as part of the Class C examination you have to have yourself examined in code speed by some licensed operator with whom you have made an arrangement to that effect. He must either be the holder of a *Class A* or *Class B* amateur license or must have held within five years a license as a commercial radiotelegraph operator or must have been employed within five years as a radiotelegraph operator in the service of the United States. See §12.44. You will also have to provide yourself with a witness who will open the envelope of questions and certify that you wrote out the answers without assistance. This may be the same person who gives you your code test; if it is someone else, that person must be at least 21 years of age. If you do not know a licensed operator in your vicinity, communicate with the nearest radio club or write your ARRL Section Communications Manager (directory in front of every issue of the League's magazine *QST*), or ask the radio inspector to designate someone in your vicinity. You must know the name of your examiner-witness before filling out the application. There is, in fact, a specified sequence: first you fill out Form 610 (the application) which includes the data on the examiner and witness, and then you swear to it before a notary. Next you get your code examiner to give you your code

test and to fill out and certify a statement of your code speed, for which a space is provided on the application form. Then, and only then, are you ready for the written examination. If you do not pass the code test, you must return the examination envelope unopened, and wait a month before trying again, during which you do some more studying. But if your code speed test was passed successfully, and the certification accomplished, your witness may *then* open the sealed examination envelope. He examines it and sees that it consists of a number of sheets of paper, bearing the examination questions. He hands these to you. You proceed to the answering of the questions. You must, unless disability prevents, write with ink, not typewriter or pencil, although you may draw any necessary diagrams with pencil. Your witness must remain constantly present, and at the conclusion sign a certification that he opened the envelope and that you wrote out the answers in his presence and without assistance from any source. There is space for this also on the application form. Then you put both the application form and the examination sheets in the envelope provided, and mail them direct to the Federal Communications Commission. If you have passed, your license will come to you in a few weeks. If you have failed (you will be notified but will not be told on what questions you failed) don't be too discouraged — study some more for the examination and after another month or so try it again.

If, after failing either the code test or the written examination, a Class C applicant is willing to take his chances on personal examination before an inspector for a Class B license, he does not have to wait thirty days from the time of his C failure but can go up for the B examination as soon as he wants to — even the next day.

The application Form 610 is self-explanatory and needs no treatment here except to say that you should not be concerned over that item which requires you to waive claim to the use of any particular frequency or of the ether as against the regulatory power of the United States. This is a form requirement under the law, and agreement is required of all licensees, whether amateur or commercial.

Applicants for amateur licenses in Alaska except Juneau, the Virgin Ids., and Hawaii except Oahu may apply for Class C licenses through the offices of the inspectors at Juneau, San Juan and Honolulu, respectively. In this case they must make arrangements for their code tests with such persons as qualify under §12.44. Applicants in Guam may take the Class B examinations, in which case they must make arrangements with the Naval District Communications Officer at Agana, Guam, who will undertake to give the examination to the applicant. Class B is also available in Alaska by appointment with the Juneau inspector or the FCC resident representa-

tive at Anchorage; or by arrangement with officials at Signal Corps stations, or U. S. Coast Guard officials who visit certain points by boat, and who will secure the sealed envelope for the examination from the inspector and administer the test. All postmasters in Alaska, by the way, are now authorized to administer the necessary oaths. The Pacific islands except Hawaii are temporarily a special matter because of military occupancy, and the Aleutians are possibly included in this category. You can get reliable information on amateur licensing only by making a current inquiry.

Readers interested in Class A for these territories and possessions are referred to the introduction to the Class A examination which appears farther on in this booklet.

Citizenship & Fingerprints

FCC Order No. 75-D, printed in the rear of this booklet, requires every applicant for a new amateur license to file his fingerprints. This is the chief remainder of a wartime order that once also required elaborate proof of citizenship. When you get your application blanks from your inspector, you will also receive a fingerprint card. If you are appearing in person for examination, take the form with you and have the inspector make the impressions. If you are a Class C applicant, and cannot get to an FCC inspector, have it done by a law-enforcement agency such as your local police. Don't forget to sign the fingerprint card in the presence of the certifying official, with the same signature that you use on the questionnaire.

Proof of citizenship by birth is no longer required. If your citizenship is derivative or as the result of naturalization, the additional facts are to be reported on the application form. Since FCC reserves the right to ask for more information in questionable cases, it would be advisable to take along your evidences of citizenship to show the inspector when you report for examination — if you are not a citizen by birth.

Physical Disability

No physical infirmity is a bar to the issuance of amateur operator and station licenses, provided the applicant can qualify. An invalid or shut-in who lives more than 125 miles from the nearest examining point will, of course, follow the usual mail procedure specified for the Class C license. But if he lives within the 125-mile limit and is genuinely incapable of traveling, he is similarly entitled under §12.21 to take the Class C examination and should request papers therefor from his district inspector. The application itself must be accompanied by a physician's certificate stating that the applicant is unable to appear for examination because of protracted disability; and sometimes the inspector will ask to see such a certificate before he will send the Class C envelope

to a location where normally only Class B is available. Needless to say, the infirmity must be of a permanent or semi-permanent nature; temporary sickness does not entitle one to exemption from appearance.

Some applicants for license, whether it be Class A, B or C, are unable to write out their own examinations in longhand because of blindness or other disability. In such cases, the Commission will permit the applicant to typewrite or dictate the code test and examination answers. If unable to draw the required diagrams, the applicant may instead give a detailed verbal description of them essentially equivalent. When this practice is observed, the witness or examining officer must certify that the examination comprises solely the applicant's efforts or dictation, and that no outside assistance was rendered. The nature of the disability must also be stated and if the examination was dictated the name and address of the person or persons who took and transcribed the dictation must be noted.

Renewals

Provided you show a certain amount of activity as an operator yourself, both your operator and station licenses may be renewed indefinitely merely upon application. Since the two licenses run concurrently, they are renewed simultaneously.

Proof of activity is no longer required for the renewal of a station license but it remains essential to renewing an operator license, so you had better be thoroughly familiar with the requirement. See §12.27. It is required that, during the last half-year of the five-year term of your operator license, you shall have worked at least three other FCC-licensed amateur stations, and that these contacts be by means of radiotelegraphy (code), not 'phone. Thus every amateur must demonstrate continuing proficiency in the code during each license term. The communication may be either from your own or any other FCC-licensed amateur station.

Renewal applications must be filed during the last four months of the license term, not more than 120 days before expiration, not later than the expiration date. Assuming you have the required activity, the process is simple. About four months before expiration, write your district inspector for an amateur application form. You will note it is the same form used for new applications and modifications. You, of course, fill out the heading as a "renewal." If you have a licensed station, fill out both parts of the form — which you will find an easy, straightforward job. If the form you get calls for proof of activity of your own station, you may ignore this, since it is no longer required; but you must carefully supply that information in the case of the operator portion. Execute the affidavit. Attach any and all valid FCC amateur operator and station licenses

you may currently hold. This is essential, and nothing causes so much delay as to forget to return your expiring license(s). They will be cancelled and sent back to you as souvenirs. Mail your renewal papers direct to Federal Communications Commission, Washington 25, D. C. Your new licenses should come to you in a few weeks and, if you have been at all forehanded about the matter, before the expiration of your turned-in tickets. You may continue to operate during the time your licenses are away for renewal, but not beyond their expiration date.

If you fail to file renewal application in time, or if you can't show three contacts by radiotelegraphy, you must qualify for a new license by again taking the amateur examination. You'll get your old call back but meanwhile you'll be off the air. So make sure you know your expiration date and that you take the proper steps for renewal in plenty of time.

Modifications

The holder of a Class B or C license is eligible to apply for the Class A examination, provided he has held his ticket for at least a year. The holder of Class C is also eligible at any time to go up for his Class B license (thereby eliminating the possibility in the future of being called up for personal examination at an inconvenient time and distance) whenever and wherever he can arrange for personal appearance before an inspector. (A Class C holder desiring Class A must also take the Class B test.) All these cases require personal appearance before an inspector. Qualifying for any such higher grade of license results in re-issuing the operator license in "modified" form; in such cases, the term of both the operator and station license is also extended and becomes five years from the date of modification. If you are interested in a higher class of license, communicate with the inspector for your district; you can take your examinations before any inspector in any district, however.

If you change your station's location by moving to another address in the same city, or to another part of the state, or into another state, you must apply for a "modification" to authorize the new address. The procedure for this is the same as an original application except that of course you do not have to pay any attention to those portions of the application form relating purely to the operator license. Write your district inspector for the usual amateur application form and fill out the "station" part as usual, except that it is now designated at the top as an application for modification.

When you have filled out the form, mail it, together with your existing license, to the Federal Communications Commission, Washington 25, D. C., not to the inspector. Modifications of this type result in extensions of the license period for both operator and station portions; when you

get your modified license back you will find it is really a new license running for a full five years.

Of course, if at the same time that you want to change the address of your station it is necessary for any reason for you to take an operator examination before the inspector, you would not mail any of the forms direct to the Commission. You would return them to the inspector and await his instructions when to appear for personal examination. Direct return to the Commission is in order only when no personal appearance is required.

When your licenses have been mailed in for modification or renewal of either station or operator privileges, you may continue to operate until the new ticket is received (but not beyond the expiration date) with this one exception: If you are modifying to change the station address, the period that you may operate without the station license in your possession must not in any case exceed four months, and portable procedure must be used meanwhile. See § 12.93(a).

If a Class C amateur moves to a point within one of the 125-mile Class B circles, he may apply for modification to change the address and, employing portable procedure under § 12.93(a), may continue operating while awaiting modified licenses — up to the theoretical four months. But his case is complicated by the fact that he is also under the necessity of appearing in person at an examining point and qualifying for Class B within four months of moving into the circle, or losing his license. See § 12.45. Since modification of a license actually results in reissuance for a new term of five years, it cannot be expected that FCC will act until he qualifies for Class B — they will put the application on ice and await the exam. Therefore, inevitably, amateurs who wait until late in the four months' period to take the exam will fail to receive new licenses before the authorized operating period expires, and will have to go off the air. The same thing is true of Class C amateurs who have a new examining point opened up within 125 miles airline of them. Such amateurs will therefore be well advised to take the examination as early as possible after moving or after the establishment of a new circle that contains their location. Another advantage is that if they fail the exam, there will still be time in the four months to try it again.

It is not necessary to apply for modification to change only the address on an operator-only license, with no station license involved.

Exemptions

Applicants for Class A who hold Class B will be required to pass only the special Class A examination. Class C applicants for Class A will, however, have to take both the B and A tests in full, including a code test.

Applicants for any class of amateur license who within five years have held a commercial radio-

telegraph first- or second-class license are exempted from the code test. However, no other credit is allowed for the holding of any commercial operator license. They no longer count for the theory portion of either the Class A or B examination.

An applicant for Class A may skip the advanced 'phone theory exam if he has held Class A within two years prior to application — but commercial radiotelephone licenses no longer exempt, since amateur 'phone technique differs so much from commercial.

Regulations and Orders

Every amateur must be familiar with the FCC regulations. They are printed and indexed at the end of this booklet. Because of complications left over from the war FCC has also issued a number of temporary orders which in some cases, temporarily modify some amateur requirements. These orders, too, are to be found at the end of this publication, and the applicant should be familiar with their provisions.

Passing the Operator Examination

And now to the examination itself. We first take up the Class B and C examination.

The examination consists of about 50 questions. Approximately two-thirds of the questions are on technical subjects; the remainder concern themselves with amateur regulations. For the most part these questions are the quickly answered "multiple-choice" type (explained in detail in the next paragraph) which require merely that the applicant indicate the correct one of several suggested answers. Some of these require simple mathematical calculations, in addition to which there are some questions — not of the multiple-choice type — which also require the solution of simple problems in arithmetic; finally, some of the questions involve the drawing of a requested circuit diagram.

A word about the "multiple-choice" type of query. This is the kind frequently used in current-events quizzes, where a question is asked and four or five possible answers given, one of which, *and only one*, is correct. In answering such a question, it is necessary only to indicate which is the correct answer; no explanation or comment is required. In the amateur examination, each of the possible answers is numbered, and a space is left at the right-hand side of the sheet in which the applicant puts down the number of the correct answer. Two types of multiple-choice questions, with the correct answer designated in each case, are as follows:

A. San Francisco is located in:

1. Nebraska.
2. New York.
3. Oregon.
4. California.
5. Texas.

(Correct answer number indicated here)

4

- B. San Francisco is *not* located in:
1. The Western Hemisphere.
 2. The United States.
 3. North America. (Correct answer number indicated here)
 4. California.
 5. Canada.

5

As is apparent, the number put down must be either 100% right or 100% wrong. There is no opportunity for part credit on questions; an applicant gets either full credit for correct answer or no credit at all for an incorrect one. For the person who is adequately prepared, an examination of this type is easier than the "essay" type. It is also fairer in that the personal opinion of the examiner cannot enter as a factor; there is thus no possibility of being "docked" part credit because a particular examiner might regard an answer as insufficiently detailed, etc., as could be the case in connection with the essay-type reply.

The questions and answers in this booklet are designed to give you all the knowledge you need to answer correctly the actual examination questions. But it should be emphasized that *the questions we list here are not the actual questions in the license examination*, nor do they correspond question-for-question to similar examination items. What they are, however, are carefully prepared items designed to insure that you have the necessary knowledge to cope with the actual test queries. For instance, the examination might have a question or a problem which involved the use of Ohm's Law to answer properly. Without in any way duplicating that particular problem, or even its type, a question could be devised which made it necessary for the student to learn the use of Ohm's Law to the extent required in the examination. Similarly, if we give a question here requiring that the student draw the diagram of a multi-stage r.f. amplifier, it is a fair assumption he would subsequently be able to draw diagrams

of any one of its individual stages.

To the questions asked in this booklet we give carefully considered answers which naturally take the form of brief discussions. Where the subject needs a little more explanation you will find a note appended, as in the questions involving arithmetic, where we show how the computation is made. But bear in mind that your actual examination will be in the multiple-answer form and that you will not have to write out a response but will simply identify the answer you perceive to be correct. There may be several questions in the actual examination revolving around one simple discussion in this manual, but when you understand the subject you can readily check off answers to any number of questions on it. If our answers sometimes seem to the initiated to be naïve or incomplete, rest assured that they are sufficient for the purpose. You may similarly encounter several demands for circuit drawing derived from a single one of our drawings, but if you know the whole circuit you know all its parts.

In other words, the purpose of this manual is not to give the student the actual questions he will meet but to equip him with the knowledge he must have to pass the examination. In order to familiarize himself with the underlying principles, we also suggest a study of *The Radio Amateur's Handbook*, particularly those chapters dealing with elementary electrical and radio principles, basic transmitter, radio-frequency, audio-frequency and power-supply circuits, frequency-measuring and monitoring equipment, and radio-telephony.

The person who can send and receive international code at the required "thirteen-per" and feels confident he can answer any of the questions in this manual need have no fear whatever of the examination. And in the event of failure, remember that the examination may be taken again after thirty days.

TEMPORARY CHANGES

WITH some amateur bands still employed by the military services, amateurs are cautioned that the frequencies listed in the FCC amateur rules in this booklet are not thereby made available for actual current use. Operation is permitted only on frequencies specifically authorized by FCC in its orders in the No. 130 series. The current order in this series, No. 130-E, was dated March 29th and recites the frequencies open to amateur use as of April 1, 1946, in the following language:

2. (a) The following frequency bands are available for use for amateur station operation, subject to the limitations and restrictions set forth herein:

(1) 3625 to 4000 kc., using type A1 emission, and, on frequencies 3900 to 4000 kc., type A3 emission, subject to the restriction that A3 emission may be used only by an amateur station which is licensed to an amateur operator holding Class A privileges and then only when operated and controlled by an amateur operator holding Class A privileges. This band may be used for amateur station operation on and after, but not before, April 1, 1946, 3:00 A.M. Eastern Standard Time. Use of this band is restricted to amateur stations within the continental limits of the United States, the Territories of Alaska and Puerto Rico, and the Virgin Islands.

(2) 27.185 to 27.455 Mc., using types A0, A1, A2, A3 and A4 emissions, and also special emissions for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques). This band is subject to use also for operation of scientific, industrial and medical apparatus.

(3) 28.0 to 29.7 Mc., using type A1 emission.

(4) 28.1 to 29.7 Mc., using type A3 emission.

(5) 29.0 to 29.7 Mc., using special emission for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques).

(6) 50.0 to 54.0 Mc., using types A1, A2, A3 and A4 emissions and, on frequencies 52.5 to 54.0 Mcs., special emission for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques).

(7) 144 to 148 Mc., using types A1, A2, A3 and A4 emissions and special emissions for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques). The portion of this band between 146.5 and 148 Mc. shall not be used, however, by any amateur station located within 50 miles of Washington, D. C., Seattle, Washington, or Honolulu, T. H.

(8) 235 to 240 Mc., using types A1, A2, A3 and A4 emissions and special emissions for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques).

(9) 420 to 430 Mc., 1215 to 1295 Mc., 2300 to 2450 Mc., 5250 to 5650 Mc., 10,000 to 10,500 Mc., and 21,000 to 22,000 Mc., using on these six bands, types A1, A2, A3, A4 and A5 emissions and special emissions for frequency modulation (radiotelephone

transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques). Peak antenna power on the band 420 to 430 Mc. shall not exceed 50 watts.

(b) No frequencies other than those assigned in this order shall be used for amateur operation.

But with amateur privileges rapidly reopening, the situation changes frequently and the student should keep himself posted on what is currently permissible by inquiry of his local club or ARRL, or by listening to the bulletins of the ARRL headquarters station, W1AW, nightly from Monday through Friday, at 7 P.M. and 10:30 P.M., Eastern Standard Time, on 3555, 7145, 14,280, 29,150 and 52,000 kc.

Answers to examination questions about the amateur bands should be given in terms of the bands as they exist in the FCC rules, whether operation is currently permitted or not. The answers in this booklet are correct as of the date of publication.

Amateur operator licenses that were valid on Dec. 7, 1941, or issued since that date, and not since suspended or surrendered, have been kept automatically alive by FCC orders in its No. 115 series, published on page 30 herein. All such licenses now expire sometime between Dec. 8, 1946, and Dec. 7, 1947. Amateur station licenses valid at any time between Dec. 7, 1941, and Sept. 15, 1942, were reinstated by FCC and, by its Order No. 130-F, published on page 30 herein, validated for the extended term of the operator license held by licensee of the station. Thus both the operator and the station license of every prewar amateur will expire simultaneously on the anniversary of the date of issuance which falls between Dec. 8, 1946, and Dec. 7, 1947. Renewal applications may be filed any time within the 120 days preceding that expiration date. Old licenses must be returned for cancellation. *Applications for renewal (or station-license modification) should not be filed until the period thus indicated.*

New licenses, both operator and station, are available for new applicants. While the calls assigned new stations conform to the new call areas, existing prewar calls will be changed so to conform only as renewals are issued.

Order 77-E, published in this booklet, temporarily suspends the requirement in

(Concluded on page 31)

Questions and Answers for the Amateur Examinations

FOR CLASSES B AND C

1. Name the basic units of electrical resistance, inductance, capacitance, current, electromotive force or potential difference, power, energy, quantity, magneto-motive force, and frequency.

The unit of electrical resistance is the ohm.

The unit of inductance is the henry.

The unit of capacitance is the farad.

The unit of current is the ampere.

The unit of electromotive force or potential difference is the volt.

The unit of power is the watt.

The unit of energy is the joule.

The unit of quantity is the coulomb.

The unit of magneto-motive force is the gilbert.

The unit of frequency is cycles-per-second or, simply, cycles.

2. Name the instruments normally used to measure (a) electric currents; (b) potential difference; (c) power; (d) resistance; (e) frequency.

(a) Electric current is measured by an ammeter; (b) potential difference by a voltmeter; (c) power by a wattmeter; (d) resistance by an ohmmeter; and (e) frequency by a frequency-meter.

3. How may plate power input of an amplifier be determined when the plate voltage and plate current are known?

The plate power input of an amplifier in watts is equal to the product of the plate voltage in volts and the plate current in amperes.

Note: For example, the power input to an amplifier operating at a plate voltage of 1000 volts with plate current of 125 milliamperes (0.125 ampere) would be 125 watts.

4. Explain the purpose of using a center-tap return connection on the secondary of a transmitting tube's filament transformer.

A center-tap return connection for the grid and the plate circuit is provided on the secondary of a transmitting tube's filament transformer to prevent modulation of the emitted wave by the alternating-current filament supply.

5. If the high-voltage secondary of a plate transformer was changed from a full-wave center-tapped to a bridge rectifier connection, what would be the relative voltage and current output ratings as compared to those for the full-wave center-tapped connection?

With the bridge connection the output-voltage rating would be double while the current rating would be half that for the center-tapped connection. In consequence, filter condensers of twice

the voltage rating would be required for the bridge connection, while the filter choke might have one-half the current rating for full output.

6. Why is it advisable to use a plate power supply for the oscillator of a transmitter separate from the final amplifier plate power supply?

It is advisable to use a separate plate power supply for the oscillator because frequency modulation of the emitted carrier is likely to occur with a power supply common to the oscillator and other stages of the transmitter — because of plate-voltage variations with changing load.

7. How does a swinging choke operate to improve the voltage regulation of a plate-supply filter system?

The swinging choke provides increased inductance with decreasing load current, thus tending to keep the output voltage constant with varying load.

8. Why is full-wave rectification generally preferable to half-wave rectification in a power supply?

Full-wave rectification is generally preferable because the output is easier to filter as a consequence of the higher ripple frequency.

9. What are the relative advantages and disadvantages of mercury-vapor and high-vacuum rectifiers of equivalent filament ratings?

The mercury-vapor rectifier has a lower internal voltage drop of nearly constant value, along with a relatively high current rating. However, the mercury-vapor rectifier also has a critical inverse peak voltage rating and a critical peak-current rating which must not be exceeded in operation. Because of the critical peak-current rating it is not advisable to use mercury-vapor type tubes with condenser-input filters. On the other hand, while the high-vacuum type rectifier has a greater internal voltage drop, the inverse peak-voltage rating is limited only by the insulation within the tube and it does not have a critical peak-current rating, so that it may be used safely with a condenser-input filter.

10. What are the principal output-voltage ripple frequencies with half-wave and full-wave single-phase rectifiers, in terms of the a.c. supply frequency?

With a half-wave rectifier, the principal output ripple frequency is equal to the alternating-current supply frequency; while with a full-wave single-phase rectifier the principal output ripple frequency is twice the a.c. supply frequency.

11. What is the principal reason for using a filter in a plate power-supply system?

The principal reason for using a filter in a plate power-supply system is to smooth out the a.c. ripple component in the output and make it "pure d.c."

12. What would be a suitable type and the approximate capacitance of the filter condensers in a typical 1000-volt transmitter plate-supply system?

Suitable types of filter condensers would be paper, oil-filled, or pyranol types of 2- to 4- μ fd. capacitance with a working voltage of more than 1000 volts.

13. What would be the visible operating results of a short-circuited filter condenser in a plate power supply with an unfused primary circuit?

With high-vacuum type rectifier tubes the plates would become red hot, while with mercury-vapor rectifiers the normal bluish-green glow would become considerably brighter.

14. Why should a fuse be used in the transformer primary circuit of a power-supply system?

A fuse should be used in the transformer primary circuit to prevent damage to the power supply from overload.

15. Why is a bleeder resistor connected across the output circuit of a high-voltage power-supply system?

A bleeder resistor is used to give better voltage regulation by providing a minimum fixed load on the power supply.

16. What would happen if the primary of a 60-cycle power supply was connected to mains carrying continuous direct current?

With d.c. applied, excessive current would flow in the primary winding of the power transformer.

17. What is the principal advantage of a screen-grid type r.f. amplifier tube over a triode of equal output rating?

The principal advantage of the screen-grid type tube is that it does not require an external neutralizing circuit because the screen-grid reduces the effective capacitance between the control grid and plate to a very small value.

18. What tube rating indicates the maximum safe heat radiation capability of the anode of a vacuum tube?

The maximum safe heat radiation capability of the anode is indicated by the "maximum plate dissipation" rating, expressed in watts.

19. In the classification of tubes according to the number of elements, how many grids has each of the following types: (a) diode; (b) triode; (c) tetrode; (d) pentode; (e) heptode?

(a) Diode, no grid; (b) triode, one grid; (c) tetrode, two grids; (d) pentode, three grids; (e) heptode, four or five grids, depending upon the type.

Note: For each type, with the possible exception of the heptode, the number of grids is two less than the total number of elements in the tube as indicated by the general type name. The diode has two elements; the triode, three elements; the tetrode, four elements; the pentode, five elements; and the heptode, seven elements.

20. Describe the adjustment procedure for proper neutralization in a radio-frequency power amplifier using an r.f. indicator coupled to the plate tank circuit.

The adjustment procedure for proper neutralization is as follows: The plate voltage is first removed from the tube or tubes of the stage to be neutralized. This is an especially important precaution, because the amplifier cannot be neutralized with plate voltage applied. The input and output circuits are then tuned to resonance with the excitation frequency, as indicated by maximum reading of the r.f. indicator coupled to the plate tank circuit. The neutralizing condenser or condensers are then adjusted, while the input and output circuits are tuned to resonance, until the r.f. indicator shows that there is no r.f. power in the plate tank circuit.

21. Why is it necessary to neutralize a triode radio-frequency power amplifier operating with input and output circuits tuned to the same frequency?

The triode r.f. amplifier must be neutralized to prevent self-oscillation.

22. What undesirable effects may result from operation of an unneutralized triode r.f. amplifier in a transmitter?

Self-oscillation may result, with consequent radiation on undesired frequencies, possibly outside an amateur band.

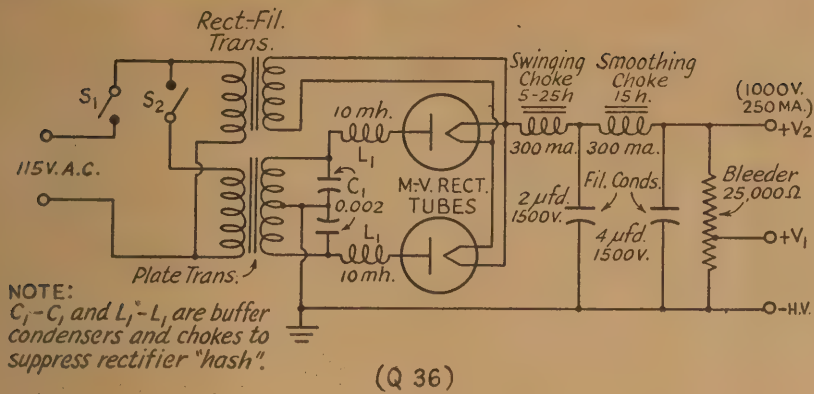
23. What undesirable effects result from frequency-modulation of an amplitude-modulated carrier wave?

Such unintentional frequency-modulation of an a.m. signal causes spurious sidebands ("broad signals") and unnecessary interference.

24. What operating conditions would be favorable for harmonic generation in a radio-frequency doubler or frequency-multiplying amplifier?

Operating conditions encouraging harmonic generation are high negative-grid bias, with ample excitation, and a high-impedance plate circuit tuned to twice the excitation frequency (one-half the wavelength of the excitation voltage).

25. Where is link coupling applicable in an oscillator-amplifier type transmitter?



Note: The formula for calculation of the precise crystal frequency for operation as near as possible to the *low-frequency* end of a band is

$$f_x = \frac{f_L}{1 - n} + k$$

where f_x is the crystal frequency

 f_L is the lower band-limit frequency

n is the calibration tolerance, expressed as a decimal

k is the frequency range allowed for temperature and circuit variation.

In this case,

$$f_x = \frac{3500}{1 - 0.0004} + 1 = \frac{3500}{0.9996} + 1 = 3501.4$$

$$+ 1 = 3502.4 \text{ kc.}$$

The nearest whole-number kilocycle frequency safely inside the band for the specified tolerance with the additional allowance of 1 kc. is therefore 3503 kc. (*not* 3502 kc.).

35. For what frequency should you order your crystal for operation as close as safely possible to the upper band limit of 4000 kc., with the same calibration accuracy and allowance given in Question 34?

The crystal should be ordered for a specified frequency of 3997 kc.

Note: The formula for calculation of the precise crystal frequency for operation as near as possible to the *high-frequency* end of the band is

$$f_x = \frac{f_U}{1+n} - k$$

where f_x is the crystal frequency
 f_U is the upper band-limit frequency

n is the calibration tolerance,
expressed as a decimal

k is the frequency allowance for

temperature and circuit variation.

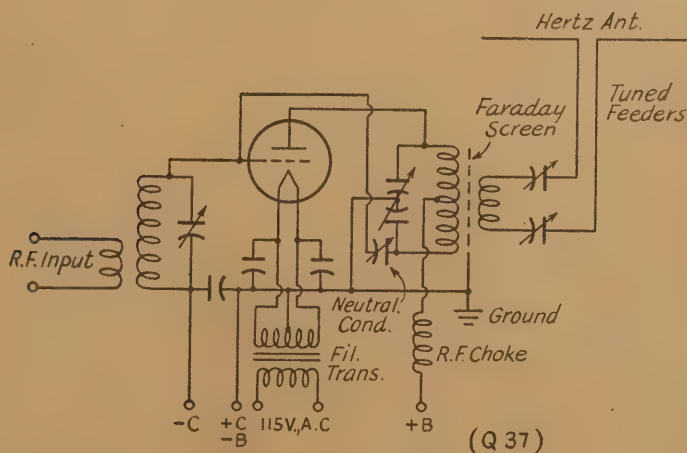
In this case,

$$f_x = \frac{4000}{1.0004} - 1 = 3998.4 - 1 = 3997.4 \text{ kc.}$$

The nearest whole-number kilocycle frequency safely inside the band for the specified tolerance and additional frequency allowance is therefore 3997 kc.

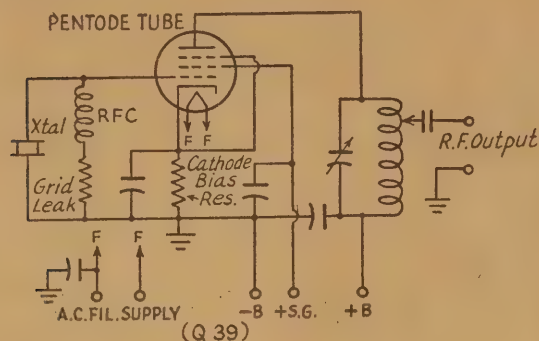
36. Draw a schematic diagram of a full-wave single-phase power supply using a center-tapped high-voltage secondary with a filter circuit for best regulation, showing a bleeder resistor providing two different output voltages and a method of suppressing "hash" interference from the mercury-vapor rectifier tubes. Give the names of the component parts and approximate values of filter components suitable for either amateur radiotelephone or radiotelegraph operation.

37. Draw a simple schematic diagram of a plate-neutralized final r.f. stage using a triode tube coupled to a Hertzian antenna, showing the antenna system and a Faraday screen to reduce harmonic radiation.



38. Draw a simple schematic diagram of a half-wave rectifier with a filter which will furnish pure d.c. at highest voltage output, showing filter condensers of unequal capacitance connected in series, with provision for equalizing the d.c. drop across the different condensers.

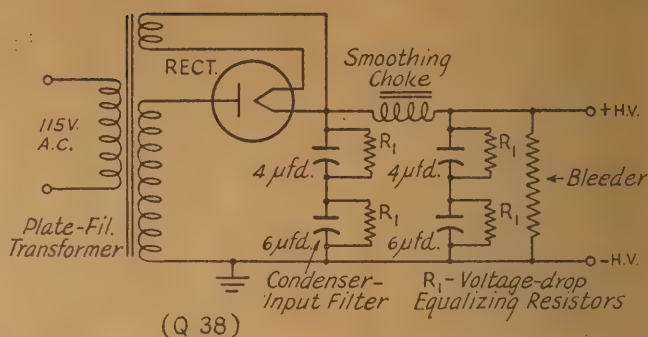
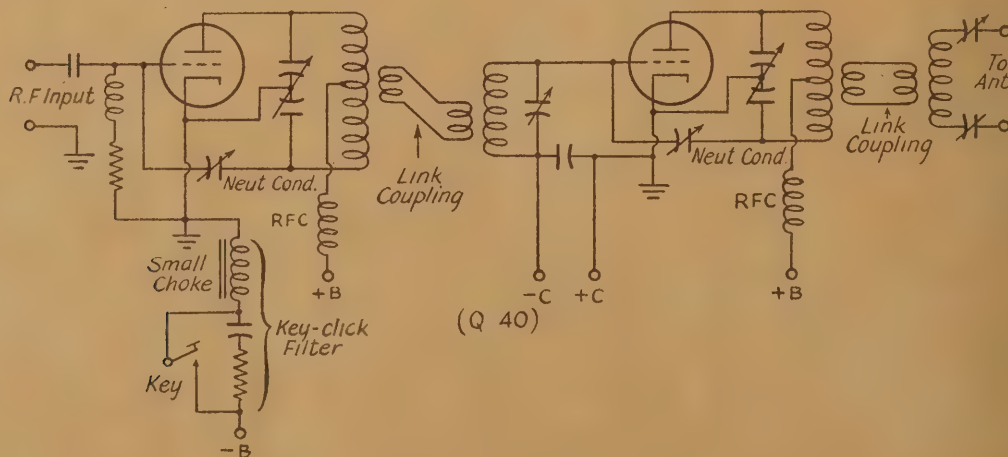
39. Draw a simple schematic diagram of a piezo-electric crystal-controlled oscillator using a pentode vacuum tube, indicating polarity of electrode supply voltages where externally connected.



Note: The circuit for a tetrode (four-element) tube would be the same except that the suppressor grid would be omitted. For a triode oscillator, both the suppressor and screen grid would be omitted, as would also be the screen-grid supply-voltage terminal indicated on this pentode diagram.

40. Draw a simple schematic diagram of two r.f. amplifier stages using triode tubes, showing the neutralizing circuits, link coupling between stages and between output and antenna system, and a keying connection in the negative high-voltage lead including a key-click filter.

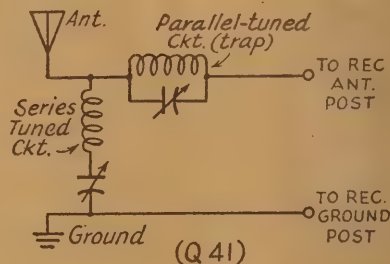
41. Draw a schematic diagram of a filter for reducing amateur interference to broadcast reception consisting of a series-tuned circuit connected in shunt with the b.c. receiver input to by-pass the interfering signal and a parallel-tuned (trap) circuit in series with the receiver input to reject the interfering signal.



42. Draw a schematic diagram of a pentode audio power-amplifier stage with an output coupling transformer and load resistor, showing suitable instruments connected in the secondary for measurement of the audio-frequency voltage and current, and naming each component part.

43. What is the principal purpose of using door interlock switches on a transmitter?

Door interlock switches are used on a transmitter to prevent the operating personnel from accidentally being shocked by dangerous high voltages.

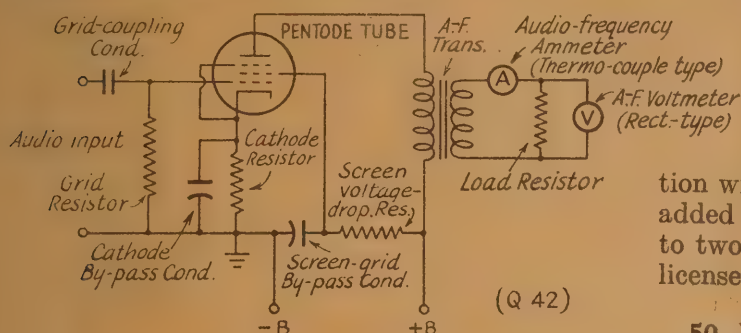


44. What is the usual means for protecting amateur station equipment from damage by charges of atmospheric electricity on the antenna system?

The usual means for protecting amateur station equipment is an antenna grounding switch.

45. What is a safe procedure for removing an unconscious person from contact with a high-voltage circuit?

The safe procedure is first to open the main switch of the high-voltage power supply and then remove the victim from contact with the high-voltage circuit. No direct contact should be made with any part of the victim's body until the high-voltage switch has been opened.



46. Using a frequency meter with a possible error of 0.75%, on what whole-number kilocycle frequency nearest the high-frequency end of the 3500-4000 kc. amateur band could a transmitter safely be set?

The frequency is 3970 kc.

Note: The formula for precise calculation of the frequency indicated by the meter is

$$f_x = \frac{f_U}{1 + n}$$

where f_x is the indicated frequency

f_U is the upper band-limit frequency

n is the specified percentage error, expressed as a decimal.

In this case,

$$f_x = \frac{4000}{1.0075} = 3970.2 \text{ kc.}$$

47. Using a frequency meter with a possible error of 0.75%, on what whole-number kilocycle frequency nearest the low-frequency end of the 7000-7300-kc. amateur band could a transmitter safely be set?

The whole-number kilocycle frequency nearest the low-frequency end of the band on which the transmitter may be safely set is 7053 kc.

Note: The formula for precise calculation of the frequency indicated by the meter is

$$f_x = \frac{f_L}{1 - n}$$

where f_x is the frequency indicated by the meter

f_L is the lower-limit frequency of the band

n is the specified percentage error, expressed as a decimal.

In this case,

$$f_x = \frac{7000}{1 - 0.0075} = \frac{7000}{0.9925} = 7052.9 \text{ kc.}$$

48. What radio messages have priority over all other communications?

Distress calls and distress communications have absolute priority over all other communications. [Communications Act, Sec. 321(b) and FCC General Rules & Regulations, § 2.59]

49. What is the penalty for willful or malicious interference with other radio communications?

A fine of up to \$500 for each day during which the offense occurs, and suspension of operator license. However, if the willful interference is in connection with distress communications, there may be added a fine of up to \$10,000 or imprisonment up to two years, or both, and revocation of station license.

50. What is the FCC rule regarding emission of unmodulated carriers by amateur stations?

Emission of an unmodulated carrier (except for brief tests or adjustments) is prohibited on frequencies below 144 Mc. except in the band 27.185 to 27.455 Mc. [FCC amateur rules, § 12.134]

51. On what amateur bands is portable operation permitted without prior notification to the inspector of the district in which such operation is contemplated?

On all amateur bands above 25 Mc. [§ 12.92]

52. When may third-party messages be handled between amateur stations of different countries?

Third-party messages may be handled between amateur stations of different countries only when such exchange has been authorized by special agreement between the countries concerned.

53. What period of each hour shall be used for making important initial calls when a state of communication emergency has been proclaimed by the FCC?

Initial emergency calls of course may be made at any time, but during the first five minutes of each hour during an emergency all other stations on the 1750-2050 and 3500-4000 kc. bands are obliged to listen for such calls, so that is the most favorable period for attracting attention. [§ 12.156(c)]

54. When does a state of emergency affecting amateur communications become effective and when is it terminated?

When so ordered by FCC. [§ 12.156 and 12.156 (e)]

55. What amateur bands are affected and what frequencies are reserved for emergency calling when a state of communications emergency has been proclaimed by FCC?

Amateurs should read and be familiar with all the provisions of the emergency regulation, § 12.156. The amateur bands affected are the 1750–2050 kc. and the 3500–4000 kc. bands. When an emergency has been proclaimed, these bands may be used *only* for emergency communications, and all incidental calling, testing and casual conversation are prohibited. Furthermore, within these bands, the frequencies 2025–2050, 3500–3525 and 3975–4000 kc. are then reserved for emergency calling.

56. On what frequencies may a licensee holding Class B amateur privileges operate an amateur radiotelephone station?

On all amateur frequencies above 28.1 Mc. [§ 12.115]

57. What is the FCC regulation regarding transmission of music by an amateur radiotelephone station for testing purposes?

It is prohibited. [§ 12.104]

58. What is the highest modulation percentage of an amateur radiotelephone transmitter permitted by FCC regulations and under what condition may it be employed?

One hundred per cent modulation is the highest permitted, and then only when means have been employed to insure that this percentage is not in excess of the modulation capabilities of the transmitter. [§ 12.133]

59. What power input should an amateur station use for a particular communication when the maximum legal input is 1 kw.?

The minimum input necessary to maintain the desired communication. [Communications Act, § 324]

60. On what amateur bands is portable operation permitted only when prior notification has been given to the FCC inspector in charge of the district in which such operation is contemplated?

On all amateur bands below 25 Mc. [§ 12.92]

61. On what amateur bands is adequately-filtered direct-current plate power supply required for operation of an amateur transmitter?

On all frequencies below 144 Mc. [§ 12.132]

62. On what amateur bands is adequately filtered d.c. plate power supply *not* required for operation of an amateur transmitter?

On all authorized amateur frequencies above 144 Mc. [§ 12.132. See also list of said bands in § 12.111.]

63. What is the maximum permissible plate power input to the final stage of an amateur transmitter and under what circumstances may it be used?

The maximum input permitted at any time is 1 kilowatt on all bands except 420–450 Mc.,

where peak *antenna* power shall not exceed 50 watts. But this 1 kilowatt input on the other bands may be used only when means are provided for measuring it accurately; if accurate measuring facilities are not available, the maximum permissible is 900 watts. [§ 12.131]

64. How would a short-circuited turn of the coil affect the resonance frequency of a tuned circuit, and why?

A short-circuited turn would increase the resonance frequency of the tuned circuit because the inductance would be reduced.

65. What is meant by the harmonic of a fundamental frequency?

The harmonic of a fundamental frequency is a frequency which is an integral multiple (2, 3, etc., times) the fundamental frequency, the fundamental being considered the first harmonic. A frequency twice the fundamental frequency is the second harmonic, one three times the fundamental frequency is the third harmonic, etc. For instance, the third harmonic of 4000 kc. is $3 \times 4000 = 12,000$ kc.

66. What operating characteristics distinguish the electron-coupled type oscillator with regard to frequency stability?

The electron-coupled type oscillator generally has better frequency stability with varying load conditions and operating voltages than other types of self-controlled oscillators, although it is not so stable under all conditions as a crystal-controlled type oscillator.

67. What circuit conditions will minimize the harmonic components in the output circuit of a given radio-frequency amplifier stage?

Harmonic components will be minimized by a large capacitance-to-inductance ratio in the plate tank circuit, along with grid bias not much greater than cut-off value and the minimum excitation voltage for reasonably good efficiency.

68. Give the meanings of the following "Q" signals: QRK, QRM, QRT, QRX, QSA, QSY, QSZ.

QRK: The legibility of your signals is . . . (1 to 5).

QRM: I am being interfered with.

QRT: Stop transmission.

QRX: Wait (or Wait until I have finished communicating with . . .). I shall call you again at . . . o'clock (or immediately).

QSA: The strength of your signals is . . . (1 to 5).

QSY: Shift to transmission on . . . kc/s (or . . . m.) without changing the type of wave.

QSZ: Transmit each word or group twice.

EXAMINATION FOR CLASS A

The subjects so far treated in this booklet are all that one has to know to pass the examination for the ordinary amateur license of Class B or C. Such license permits c.w. telegraph operation in every amateur band and 'phone operation above 28,100 kc. However, to engage in 'phone transmission in the more desirable bands 3900-4000 and 14,150-14,250 kc., additional authorization is needed, which may be had only by passing the Class A examination.

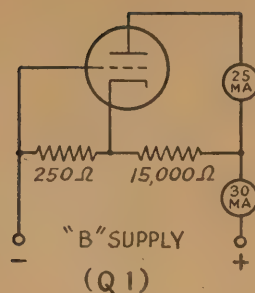
To be eligible to apply, the applicant must have had at least one year's experience as a licensed amateur operator within the five years preceding application. If he is thus eligible but at the moment does not possess a Class B license, the Class A examination consists of the questions forming the Class B examination plus about forty advanced questions dealing exclusively with amateur radiotelephony. In fact, even the holder of a Class C license must, if he aspires to Class A, appear before an inspector and take the Class B examination, including the code test — as well as the Class A. But if the applicant has had his year's experience (within the preceding five years) and already possesses a Class B license, the examination consists only of the forty-odd additional questions on radiotelephony.

The Class A examination resembles the Classes B & C in form, consisting of questions, mostly of the "multiple-choice" type but including also some requiring simple calculations and others necessitating the drawing of circuit diagrams. See our discussion of this preceding the questions for B & C. As with our questions for the examination for Class B and C, the following questions are not the actual ones in the test but are representative, and familiarity with them constitutes adequate preparation, although we again recommend study of theory in *The Radio Amateur's Handbook*, particularly the chapter on radiotelephony.

The examination for Class A is given only upon personal appearance. For most of us, this means a trip to appear in person before an examining officer at one of the examining points listed in this booklet. Applicants in Alaska may either make an appointment with the inspector at Juneau (P. O. Box 1421) or with the FCC representative at Anchorage (P. O. Box 719) or they can make arrangements with the Signal Corps or Coast Guard to secure the sealed envelope for this examination from the inspector and administer the test. In Guam, the Naval District Communications Officer is authorized to give the examination.

1. In the diagram:

- What is the d.c. plate voltage?
- What is the d.c. grid bias?
- What is the supply voltage?



- 75 volts.
- 7.5 volts.
- 82.5 volts.

Note: The bleeder current through the 15,000-ohm resistor is the difference between the total supply current and the plate current, 30 ma. — 25 ma. = 5 ma. By Ohm's Law, $E = IR$; the voltage across this resistor is therefore $0.005 \times 15,000 = 75$ volts. This is the d.c. plate voltage (voltage between plate and cathode).

The total supply current (plate current plus bleeder current = 30 ma.) flows through the 250-ohm resistor. The drop across this resistor is therefore $0.030 \times 250 = 7.5$ volts. This is the d.c. grid bias voltage (voltage between grid and cathode).

The supply voltage is the sum of the voltage drops across the two resistors, or $75 + 7.5 = 82.5$ volts.

2. What undesirable effects may result from a self-oscillating buffer amplifier in a transmitter?

Self-oscillation of a buffer amplifier may cause the emission of spurious frequencies.

3. What type amplifier and class of operation is usually preferred for a frequency doubler?

A single-ended type amplifier operating Class C is usually preferred.

4. Why is it advisable to use a separate plate-power supply for the oscillator of a multi-stage transmitter?

A separate plate-power supply for the oscillator minimizes plate-voltage variation and thus provides a higher degree of frequency stability.

5. What is the most useful operating characteristic of a "push-push" type of amplifier?

The principal output frequency is twice the excitation frequency. Hence the "push-push" type of amplifier, with the grids of two tubes connected push-pull and the plates in parallel, can be used as a frequency doubler.

6. What are the operating characteristics of the electron-coupled type oscillator with regard to frequency stability?

The electron-coupled type oscillator has better frequency stability with varying supply voltages and load conditions than other types of self-controlled oscillators.

7. What circuit conditions will minimize the harmonic components in the output of a r.f. power amplifier?

A large capacitance-to-inductance ratio in the plate tank circuit, along with relatively low grid bias and the minimum excitation voltage necessary for reasonably good efficiency, will minimize harmonic output.

8. What is the principal disadvantage of using a grid leak as the only source of bias in a Class-C r.f. power-amplifier stage?

Loss of excitation will cause loss of grid bias and an increase in the plate current.

9. What are the relative merits of triodes and screen-grid tubes as r.f. amplifiers?

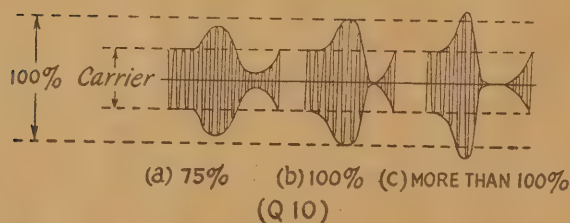
Although triodes are generally more easily loaded and are better adapted to plate modulation, they require an external neutralizing circuit to prevent feed-back and self-oscillation while screen-grid tetrodes and pentodes normally do not require neutralization because their internal grid-plate capacitance is sufficiently reduced by the screen-grid.

10. Show by a diagram the sinusoidal modulation envelope of an amplitude-modulated wave:

(a) Modulated approximately 75%.

(b) Modulated 100%.

(c) Modulated more than 100%.



11. Draw a diagram of a plate-neutralized triode r.f. amplifier stage.

12. Draw a diagram of a coupling system between two audio-frequency amplifier stages, employing resistance elements.

13. What are the principal reasons for using a choke-input type filter in a power-supply system employing mercury-vapor rectifier tubes?

The principal reasons for using a choke-input type filter are to obtain good voltage regulation and to limit the peak current through the rectifier tubes.

14. Would mercury-vapor or high-vacuum type rectifier tubes of equivalent ratings be preferable for a power supply in which filament and plate voltages must be applied simultaneously? Give the reason for your choice.

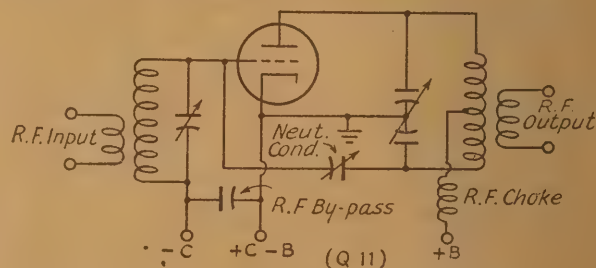
High-vacuum type rectifier tubes would be preferable because plate voltage may be applied safely without time delay for the filaments to reach operating temperature.

15. What visible operating characteristic distinguishes mercury-vapor rectifiers?

The mercury-vapor tubes show a bluish-green glow when operating normally under load.

16. Why are mercury-vapor type rectifier tubes more critical as to observance of anode voltage rating than high-vacuum type rectifiers?

The mercury-vapor tubes have a critical peak inverse voltage rating which must not be exceeded in operation, while with the high-vacuum type rectifier the peak inverse voltage is limited only by the insulation of the tube.

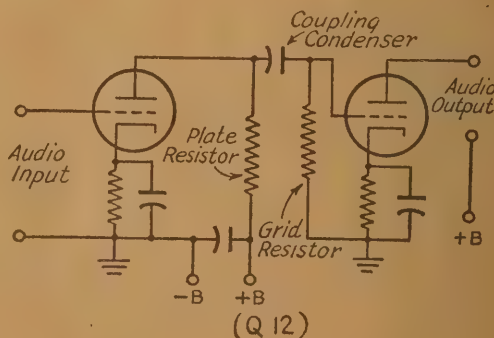


17. What advantage has a push-pull audio-frequency amplifier over a single-tube Class-A amplifier of similar excitation requirement and equal power output?

Even harmonics are not generated in the output circuit of a properly balanced push-pull amplifier.

18. What are the distinguishing operating characteristics of a Class-A type amplifier?

In a Class-A amplifier the grid bias is adjusted for operation over the linear range of the grid-voltage plate-current curve so that the output is a faithful reproduction of the input voltage wave form. The average plate current remains constant. The grid normally is not driven positive. Hence the grid draws no current. The plate efficiency is relatively low.



19. What improper operating conditions are indicated by upward or downward fluctuation of Class-A amplifier plate current when signal voltage is applied to the grid? What correction should be made?

Upward fluctuation of Class-A amplifier plate current with excitation indicates excessive negative grid bias; hence, the grid bias should be decreased. Downward fluctuation of plate current with excitation indicates insufficient negative bias; hence, the bias voltage should be increased to correct this condition.

20. Why is bias voltage generally necessary on the grid of an audio amplifier tube, and what is the principal result of improper bias?

A negative grid-bias voltage is generally necessary to obtain operation over the proper portion of the grid-voltage plate-current characteristic curve of the amplifier tube. Improper bias results in distortion of the wave form in the output of the amplifier.

21. What improper operating conditions are indicated by grid-current flow in a Class-A amplifier?

Grid current flow in a Class-A amplifier indicates either excessive excitation voltage or low negative grid bias, or a combination of both.

22. What is the principal advantage of a Class-B audio amplifier as compared to other types?

Because of its higher efficiency at maximum output and its low plate-power consumption when idling, the Class-B audio amplifier is more economical of power than a Class-A type amplifier. Because of its relatively low distortion it is, of course, preferable to a Class-C audio amplifier.

23. How should the average plate current vary in a properly-designed and operated amplitude-modulated radio-frequency power amplifier?

The average plate current of the modulated r.f. amplifier should remain constant with any constant-carrier system, regardless of the method of modulation.

24. What are the notable efficiency and distortion characteristics of a Class-B modulator employing two triodes in push-pull?

The outstanding characteristic of the Class-B modulator is its high efficiency in combination with relatively small distortion.

25. How do the excitation requirements of a Class-B modulator compare with those of a Class-A modulator having equal grid-voltage swing?

The Class-B modulator requires greater driver power because the grids are swung considerably positive and draw current on the excitation peaks.

26. What would happen if the grid-bias supply of a Class-B modulator was suddenly short-circuited?

The loss of grid bias resulting from the short circuit would cause the plate current to jump to an excessively high steady value and damage to the tubes might result if the plate dissipation was sufficient to cause the tubes to show abnormal color.

27. What is the ratio of modulator audio power output to Class-C amplifier unmodulated plate power input in a plate-modulation system:

- (a) With a sinusoidal signal?
- (b) With a two-tone signal equivalent to speech?
- (a) 50% with sinusoidal audio power.
- (b) Approximately 25% with a complex signal equivalent to speech.

28. Define amplitude modulation.

Amplitude modulation is the process by which the amplitude of the radio-frequency carrier wave is varied in accordance with the amplitude of the speech or other signal to be transmitted.

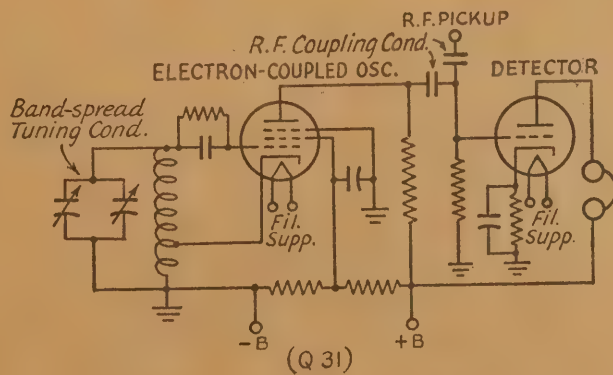
29. What are sideband frequencies?

Sideband frequencies are frequencies above and below the carrier frequency, and equal to the sum and difference of the modulation and carrier frequencies, which are produced by the process of modulation.

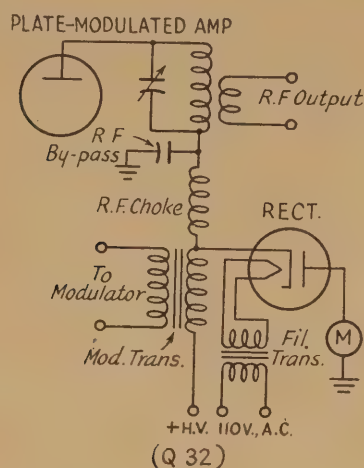
30. What radiotelephone transmitter operating deficiencies might be indicated by downward deflection of the antenna r.f. current meter during modulation of the final r.f. amplifier?

Downward deflection of the antenna r.f. ammeter might indicate insufficient r.f. excitation to the modulated r.f. stage, inadequate filament emission in the tubes of the modulated r.f. amplifier, or very poor voltage regulation of a power supply common to both modulator and r.f. amplifier.

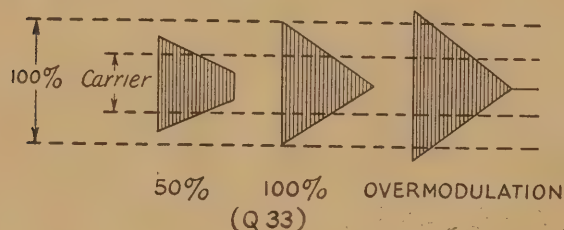
31. Draw a schematic diagram of a combination heterodyne frequency meter and monitor.



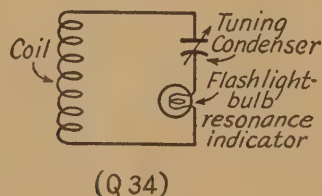
32. Draw a simple schematic diagram of a peak modulation monitor which will indicate when 100% modulation occurs or is exceeded.



33. Draw the trapezoidal type patterns showing 50% modulation, 100% modulation and over-modulation as they would appear on the screen of a cathode-ray oscilloscope properly connected to a 'phone transmitter.



34. Draw a diagram of an absorption-type frequency meter including a resonance indicator.



35. Draw a simple schematic diagram of a radio-frequency doubler stage driving a neutralized push-pull power amplifier using triodes, showing the method of interstage coupling and indicating the relative resonance frequencies of the grid and plate circuits.

36. Draw a schematic diagram of a two-stage r.f. amplifier using screen-grid tubes, showing a suitable method of interstage coupling.

37. Using a frequency meter with a possible error of 0.75%, on what whole-number kilocycle frequency nearest the low-frequency end of the 14,000-14,400-kc. band could a transmitter safely be set?

The whole-number kilocycle frequency nearest the low-frequency end of the 14,000-14,400-kc. band is 14,106 kc.

Note: For precise calculation of the frequency on which the transmitter can be set with a given percentage tolerance, the formula to be used is

$$f_x = \frac{f_L}{1 - n}$$

where f_x is the frequency on which the transmitter is to be set

f_L is the lower-limit frequency of the band
 n is the given percentage error expressed as a decimal

For this question, the equation is

$$f_x = \frac{14,000}{1 - 0.0075} = \frac{14,000}{0.9925} = 14,105.8$$

The nearest whole-number kilocycle frequency which will be safely within the band for this tolerance is 14,106 kc.

38. Using a frequency meter with a possible error of 0.75%, on what whole-number kilocycle frequency nearest the high-frequency end of the 14,000-14,400-kc. band could a transmitter safely be set?

The whole-number kilocycle frequency nearest the high-frequency end of the band is 14,292 kc.

Note: The formula for calculating the precise frequency on which a transmitter may be set nearest to the high-frequency end of the band for a given percentage tolerance is

$$f_x = \frac{f_U}{1 + n}$$

where f_x is the frequency on which the transmitter is to be set

f_U is the upper limit of the band in kilocycles

n is the percentage tolerance expressed as a decimal

For the present question,

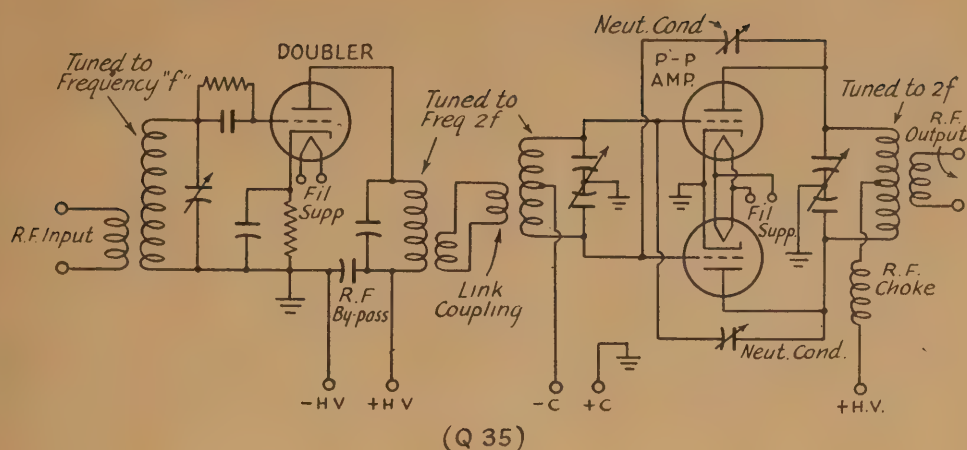
$$f_x = \frac{14,400}{1.0075} = 14,292.8$$

The nearest whole-number kilocycle frequency safely inside the band for this percentage tolerance is 14,292 kc. (not 14,293 kc.)

39. What particular precaution should be observed in using a battery-operated heterodyne frequency meter?

The "A" and "B" battery voltages should be checked because a change in battery voltage will affect the oscillator frequency.

40. What particular precaution should be taken in using an absorption-type frequency meter to check a self-excited oscillator?



The frequency meter should be very loosely coupled to the oscillator tank circuit so that the frequency calibration of the meter will be affected as little as possible by mutual coupling to the transmitter circuit.

41. What are the undesirable operation characteristics of a Y-cut crystal and what precautions should be taken when it is to be used for transmitter frequency control?

The Y-cut crystal has a relatively large temperature-frequency coefficient and tends to jump frequency in steps when the temperature varies. A Y-cut crystal also may have two fundamental frequencies fairly close to each other. For this reason, the crystal should be checked for double-frequency resonance in the oscillator circuit before the transmitter is put into operation.

42. What is the purpose of using a quartz crystal in a transmitter?

The quartz crystal determines and stabilizes the oscillator frequency.

43. What are the desirable operating characteristics of an A-cut crystal?

The A-cut crystal has high output capability and a small temperature-frequency coefficient.

44. What particular physical characteristic distinguishes an X-cut crystal from Y- and A-cut crystals of the same frequency?

The X-cut crystal is thicker for a given frequency than either the Y-cut or A-cut type.

45. What would be the visible results of a short-circuited filter condenser in a plate power supply with high-vacuum rectifier tubes and an unfused primary circuit?

The rectifier tube plates would become red-hot in operation.

46. What precaution should be taken to protect filter condensers connected in series?

Resistors having a value of approximately 100,000 ohms should be shunted across each condenser to equalize the d.c. voltage drops and thus prevent breakdown of the individual capacitors.

47. Why is a full-wave rectifier preferable to a half-wave rectifier?

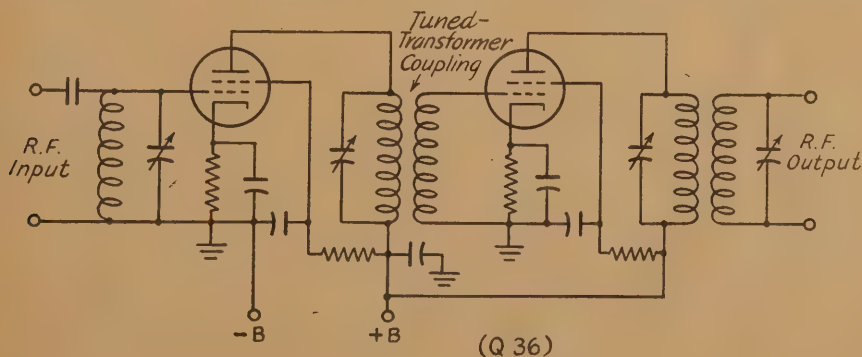
The full-wave rectifier output is easier to filter because of its higher ripple frequency.

48. Two filter chokes have the same inductance, current and insulation voltage ratings but one has twice the resistance of the other. Which would be preferable for use in a transmitter power supply and why?

The filter choke with the lower resistance would be preferable because the output voltage would have better regulation than with the higher-resistance choke.

49. What constructional precaution should be taken to insure stable operation of a transmitter having one or more neutralized amplifier stages?

Isolation of the stages from each other should be provided, either by interstage shielding or



adequate physical separation of the individual stages.

50. Explain the purpose of using a center-tap return connection on the secondary of a transmitting tube's filament transformer.

The filament center-tap connection is used to prevent modulation of the emitted carrier by the alternating-current filament supply.

51. On what amateur frequencies is frequency modulation of the emitted carrier permissible?

In the bands 29–29.7 Mc. and 52.5–54 Mc. and on all amateur frequencies above 144 Mc. [§ 12.117]

EXTRACTS FROM THE COMMUNICATIONS LAW

The complete text of the Communications Act of 1934 would occupy many pages. Only those parts most applicable to amateur radio station licensing and regulation in this country (with which every amateur should be familiar) are given. Note particularly Secs. 324, 325, 326 and 605 and the penalties provided in Secs. 501 and 502.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

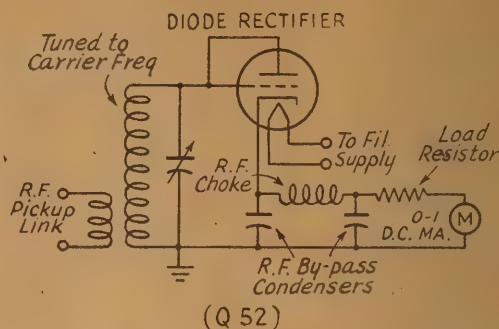
SECTION 1. For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is hereby created a commission to be known as the "Federal Communications Commission," which shall be constituted as hereinafter provided, and which shall execute and enforce the provisions of this Act.

SEC. 2. (a) The provisions of this Act shall apply to all interstate and foreign communication by wire or radio and all interstate and foreign transmission of energy by radio, which originates and/or is received within the United States, and to all persons engaged within the United States in such communication or such transmission of energy by radio, and to the licensing and regulating of all radio stations as hereinafter provided; but it shall not apply to persons engaged in wire or radio communication or transmission in the Philippine Islands or the Canal Zone, or to wire or radio communication or transmission wholly within the Philippine Islands or the Canal Zone. . . .

SEC. 4. (a) The Federal Communications Commission (in this Act referred to as the "Commission") shall be composed of seven commissioners appointed by the President, by and with the advice and consent of the Senate, one of whom the President shall designate as chairman.

SECTION 301. It is the purpose of this Act, among other things, to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license. No person

52. Draw a schematic diagram of a simple device for checking carrier shift of a radiotelephone transmitter.



shall use or operate any apparatus for the transmission of energy or communications or signals by radio (a) from one place in any Territory or possession of the United States or in the District of Columbia to another place in the same Territory, possession, or District; or (b) from any State, Territory, or possession of the United States, or from the District of Columbia to any other State, Territory, or possession of the United States; or (c) from any place in any State, Territory, or possession of the United States, or in the District of Columbia, to any place in any foreign country or to any vessel; or (d) within any State when the effects of such use extend beyond the borders of said State, or when interference is caused by such use or operation with the transmission of such energy, communications, or signals from within said State to any place beyond its borders, or from any place beyond its borders to any place within said State, or with the transmission or reception of such energy, communications, or signals from and/or to places beyond the borders of said State; or (e) upon any vessel or aircraft of the United States; or (f) upon any other mobile stations within the jurisdiction of the United States, except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act.

SEC. 303. Except as otherwise provided in this Act, the Commission from time to time, as public convenience, interest, or necessity requires, shall —

- (a) Classify radio stations;
- (b) Prescribe the nature of the service to be rendered by each class of licensed stations and each station within any class;
- (c) Assign bands of frequencies to the various classes of stations, and assign frequencies for each individual station and determine the power which each station shall use and the time during which it may operate;
- (d) Determine the location of classes of stations or individual stations;
- (e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;
- (f) Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this Act: *Provided, however,* That changes in the frequencies, authorized power, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, after a public hearing, the Commission shall determine that such changes will promote public convenience or interest or will serve public necessity, or the provisions of this Act will be more fully complied with;

(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest; . . .

(i) Have authority to make general rules and regulations requiring stations to keep such records of programs, transmissions of energy, communications, or signals as it may deem desirable; . . .

(l) Have authority to prescribe the qualifications of station operators, to classify them according to the duties to be performed, to fix the forms of such licenses, and to issue them to such citizens of the United States as the Commission finds qualified;

(m) (1) Have authority to suspend the license of any operator upon proof sufficient to satisfy the Commission that the licensee — (A) has violated any provision of any Act, treaty, or convention binding on the United States, which the Commission is authorized to administer, or any regulation made by the Commission under any such Act, treaty, or convention; or (B) has failed to carry out a lawful order of the master or person lawfully in charge of the ships or aircraft on which he is employed; or (C) has willfully damaged or permitted radio apparatus or installations to be damaged; or (D) has transmitted superfluous radio communications or signals or communications containing profane or obscene words, language, or meaning, or has knowingly transmitted —

(1) false or deceptive signals or communications; or

(2) a call signal or letter which has not been assigned by proper authority to the station he is operating; or (E) has willfully or maliciously interfered with any other radio communications or signals; or (F) has obtained or attempted to obtain, or has assisted another to obtain or attempt to obtain, an operator's license by fraudulent means.

(2) No order of suspension of any operator's license shall take effect until fifteen days' notice in writing thereof, stating the cause for the proposed suspension, has been given to the operator licensee who may make written application to the Commission at any time within said fifteen days for a hearing upon such order. The notice to the operator licensee shall not be effective until actually received by him and from that time he shall have fifteen days in which to mail the said application. In the event that physical conditions prevent mailing of the application at the expiration of the fifteen-day period, the application shall then be mailed as soon as possible thereafter accompanied by a satisfactory explanation of the delay. Upon receipt by the Commission of such application for hearing, said order of suspension shall be held in abeyance until the conclusion of the hearing which shall be conducted under such rules as the Commission may prescribe. Upon the conclusion of said hearing the Commission may affirm, modify, or revoke said order of suspension.

(n) Have authority to inspect all radio installations associated with stations required to be licensed by any Act or which are subject to the provisions of any Act, treaty, or convention binding on the United States, to ascertain whether in construction, installation, and operation they conform to the requirements of the rules and regulations of the Commission, the provisions of any Act, the terms of any treaty or convention binding on the United States, and the conditions of the license or other instrument of authorization under which they are constructed, installed, or operated.

(o) Have authority to designate call letters of all stations.

(p) Have authority to cause to be published such call letters and such other announcements and data as in the judgment of the Commission may be required for the efficient operation of radio stations subject to the jurisdiction of the United States and for the proper enforcement of this Act; . . .

(q) Have authority to require the painting and/or illumination of radio towers if and when in its judgment such towers constitute, or there is a reasonable possibility that they may constitute, a menace to air navigation.

(r) Make such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this Act, or any international radio or wire communications treaty or convention, or regulations annexed thereto, including any treaty or convention insofar as it relates to the use of radio, to which the United States is or may hereafter become a party.

SEC. 309. (a) If upon examination of any application for a station license or for the renewal or modification of a station license the Commission shall determine that public interest, convenience, or necessity would be served by the

granting thereof, it shall authorize the issuance, renewal, or modification thereof in accordance with said finding. In the event the Commission upon examination of any such application does not reach such decision with respect thereto, it shall notify the applicant thereof, shall fix and give notice of a time and place for hearing thereon, and shall afford such applicant an opportunity to be heard under such rules and regulations as it may prescribe.

SEC. 318. The actual operation of all transmitting apparatus in any radio station for which a station license is required by this Act shall be carried on only by a person holding an operator's license issued hereunder. No person shall operate any such apparatus in such station except under and in accordance with an operator's license issued to him by the Commission.

SEC. 321. . . . (b) All radio stations, including Government stations and stations on board foreign vessels when within the territorial waters of the United States, shall give absolute priority to radio communications or signals relating to ships in distress; shall cease all sending on frequencies which will interfere with hearing a radio communication or signal of distress, and, except when engaged in answering or aiding the ship in distress, shall refrain from sending any radio communications or signals until there is assurance that no interference will be caused with the radio communications or signals relating thereto, and shall assist the vessel in distress, so far as possible, by complying with its instructions.

SEC. 324. In all circumstances, except in case of radio communications or signals relating to vessels in distress, all radio stations, including those owned and operated by the United States, shall use the minimum amount of power necessary to carry out the communication desired.

SEC. 325. (a) No person within the jurisdiction of the United States shall knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent signal of distress, or communication relating thereto, nor shall any broadcasting station rebroadcast the program or any part thereof of another broadcasting station without the express authority of the originating station.

SEC. 326. Nothing in this Act shall be understood or construed to give the Commission the power of censorship over the radio communications or signals transmitted by any radio station, and no regulation or condition shall be promulgated or fixed by the Commission which shall interfere with the right of free speech by means of radio communication. No person within the jurisdiction of the United States shall utter any obscene, indecent, or profane language by means of radio communication.

SEC. 501. Any person who willfully and knowingly does or causes or suffers to be done any act, matter, or thing, in this Act prohibited or declared to be unlawful, or who willfully and knowingly omits or fails to do any act, matter, or thing in this Act required to be done, or willfully and knowingly causes or suffers such omission or failure, shall, upon conviction thereof, be punished for such offense, for which no penalty (other than a forfeiture) is provided herein, by a fine of not more than \$10,000 or by imprisonment for a term of not more than two years, or both.

SEC. 502. Any person who willfully and knowingly violates any rule, regulation, restriction, or condition made or imposed by the Commission under authority of this Act, or any rule, regulation, restriction, or condition made or imposed by any international radio or wire communications treaty or convention, or regulations annexed thereto, to which the United States is or may hereafter become a party, shall, in addition to any other penalties provided by law, be punished, upon conviction thereof, by a fine of not more than \$500 for each and every day during which such offense occurs.

SEC. 605. No person receiving or assisting in receiving, or transmitting, or assisting in transmitting, any interstate or foreign communication by wire or radio shall divulge or publish the existence, contents, substance, purport, effect, or meaning thereof, except through authorized channels of transmission or reception, to any person other than the addressee, his agent, or attorney, or to a person employed or authorized to forward such communication to its destination, or to proper accounting or distributing officers of the

various communicating centers over which the communication may be passed, or to the master of a ship under whom he is serving, or in response to a subpoena issued by a court of competent jurisdiction, or on demand of other lawful authority; and no person not being authorized by the sender shall intercept any communication and divulge or publish the existence, contents, substance, purport, effect, or meaning of such intercepted communication to any person; and no person not being entitled thereto shall receive or assist in receiving any interstate or foreign communication by wire or radio and use the same or any information therein contained for his own benefit or for the benefit of another not entitled thereto; and no person having received such intercepted communication or having become acquainted with the contents, substance, purport, effect, or meaning of the same or any part thereof, knowing that such information was so obtained, shall divulge or publish the existence, contents, substance, purport, effect, or meaning of the same or any part thereof, or use the same or any information therein contained for his own benefit or for the benefit of another not entitled thereto: *Provided*, That this section shall not apply to the receiving, divulging, publishing, or utilizing the contents of any radio communication broadcast, or transmitted by amateurs or others for the use of the general public, or relating to ships in distress.

SEC. 606. . . . (c) Upon proclamation by the President that there exists war or a threat of war or a state of public peril or disaster or other national emergency, or in order to preserve the neutrality of the United States, the President may suspend or amend, for such time as he may see fit, the rules and regulations applicable to any or all stations within the jurisdiction of the United States as prescribed by the Commission, and may cause the closing of any station for radio communication and the removal therefrom of its apparatus and equipment, or he may authorize the use or control of any such station and/or its apparatus and equipment by any department of the Government under such regulations as he may prescribe, upon just compensation to the owners.

UNITED STATES AMATEUR REGULATIONS

Pursuant to the basic communications law, general regulations for amateurs have been drafted by the Federal Communications Commission.

Every amateur should be *thoroughly familiar* with these regulations and their effect, although, of course, it is not necessary to know the exact wording from memory.

Attention should also be given to the "Temporary FCC Orders" at the end of this listing, since they modify some of the regulations at the present time.

RULES GOVERNING AMATEUR RADIO SERVICE

DEFINITIONS

§ 12.1. *Amateur Service*. The term "amateur service" means a radio service carried on by amateur stations.

§ 12.2. *Amateur operator*. The term "amateur operator" means a person interested in radio technique solely with a personal aim and without pecuniary interest, holding a valid license issued by the Federal Communications Commission authorizing him to operate licensed amateur stations.

§ 12.3. *Amateur station*. The term "amateur station" means a station used by an amateur operator, and it embraces all radio transmitting apparatus at a particular location used for amateur service and operated under a single instrument of authorization.

§ 12.4. *Amateur portable station*. The term "amateur portable station" means an amateur station that is so constructed that it may conveniently be moved about from place to place for communication, but which is not operated while in motion.

§ 12.5. *Amateur mobile station*. The term "amateur mobile station" means an amateur station that is so constructed that it may conveniently be transferred to or from a mobile unit or from one such unit to another, and is ordinarily used while such mobile unit is in motion.

§ 12.6. *Amateur radio communication*. The term "amateur radio communication" means radio communication between amateur stations solely with a personal aim and without pecuniary interest.

AMATEUR OPERATORS

LICENSES — PRIVILEGES

§ 12.21. *Eligibility for license*. The following are eligible to apply for amateur operator license and privileges:

Class A — Any citizen of the United States who within five years prior to receipt of his application by the Commission has held, for a period of a year or more, an amateur operator license issued by the Commission.

Class B — Any citizen of the United States.

Class C — Any citizen of the United States whose actual residence, address, and amateur station are more than 125 miles airline distant from the nearest location at which examinations are held at intervals of not more than three months for class B amateur operator license; or who is shown by physician's certificate to be unable to appear for examination because of protracted disability; or who is shown by certificate of the commanding officer to be in the armed forces of the United States at a military, naval or Coast Guard station and, for that reason, to be unable to appear for examination at the time and place designated by the Commission.

§ 12.22. *Application for amateur operator license*. Each application for amateur operator license shall comply with the Commission's Rules and Regulations and shall be made in writing on Form 610 (application for amateur operator and/or station license). The application shall be filed with the district field office of the Commission if personal appearance is required for operator examination. If personal appearance is not required, the application shall be sent instead to the Commission, Washington 25, D. C. All applications for class C operating privileges shall be sent to the Commission, Washington 25, D. C.

§ 12.23. *Classification of operating privileges*. Amateur operating privileges are classified as follows:

Class A — All authorized amateur privileges.

Class B or C — All authorized amateur privileges except the use of type A-3 emission on the frequency bands 3900 to 4000 kc. and 14,150 to 14,250 kc.

§ 12.24. *Scope of operator authority*. Amateur operator licenses are valid only for the operation of licensed amateur stations; and, on a temporary basis, for the operation of experimental stations (except class 2 stations) in the experimental service licensed for operation exclusively on a frequency or frequencies above 450 Mc. if such services are performed without compensation, direct or indirect, paid or promised.

§ 12.25. *Availability of operator license*. The original operator license of each operator shall be kept in the personal possession of the operator while operating an amateur station. When operating an amateur station at a fixed location, however, the license may be posted in a conspicuous place in the room occupied by the operator. The license shall be available for inspection by any authorized government official whenever the operator is operating an amateur station and at other times upon request made by an authorized representative of the Commission, except when such license has been filed with application for modification or renewal thereof, or has been mutilated, lost, or destroyed, and application has been made for a duplicate license in accordance with section 12.26. No recognition shall be accorded to any photo-copy of an operator license.

§ 12.26. *Duplicate license*. Any licensee applying for a duplicate license to replace an original which has been lost, mutilated, or destroyed, shall submit with the application the mutilated license or a statement setting forth the facts regarding the manner in which the original license was lost or destroyed. If, subsequent to receipt by the licensee of the duplicate license, the original license is found, either the duplicate or the original license shall be returned immediately to the Commission.

§ 12.27. *Renewal of amateur operator license*. An amateur operator license may be renewed upon proper application showing that within the last six months of the license term the licensee has lawfully operated an amateur station or stations licensed by the Commission, and has thereby communicated by radio telegraphy with at least three other such amateur stations in the United States. The applicant shall

qualify for a new license by examination if the requirements of this section are not fulfilled. Application for renewal of an amateur operator license shall be filed not more than 120 days prior to date of expiration of such license and not later than the date of expiration.

§ 12.28. *Who may operate an amateur station.* An amateur station may be operated only by a person holding a valid amateur operator license, and then only to the extent provided for by the class of privileges granted under the license. When an amateur station is used for telephony, the station licensee may permit any person to transmit by voice, provided that during such transmission call signals are announced as prescribed by section 12.82 and a duly licensed amateur operator maintains actual control over the emissions, including turning the carrier on and off for each transmission and signing the station off after communication with each station has been completed.

§ 12.29. *License term.* An amateur operator license is valid normally for a period of 5 years from the date of issuance of a new, renewed, or modified license.

§ 12.30. *Order of suspension.* No order of suspension of any operator's license shall take effect until 15 days' notice in writing thereof, stating the cause for the proposed suspension, has been given to the operator licensee who may make written application to the Commission at any time within said 15 days for a hearing upon such order. The notice to the operator licensee shall not be effective until actually received by him, and from that time he shall have 15 days in which to mail the said application. In the event that physical conditions prevent mailing of the application at the expiration of the 15-day period, the application shall then be mailed as soon as possible thereafter, accompanied by a satisfactory explanation of the delay. Upon receipt by the Commission of such application for hearing, said order of suspension shall be held in abeyance until the conclusion of the hearing which shall be conducted under such rules as the Commission shall deem appropriate. Upon the conclusion of said hearing the Commission may affirm, modify, or revoke said order of suspension.

§ 12.31. *Proceedings.* Proceedings for the suspension of an operator's license shall in all cases be initiated by the entry of an order of suspension. Respondent will be given notice thereof together with notice of his right to be heard and to contest the proceeding. The effective date of the suspension will not be specified in the original order but will be fixed by subsequent motion of the Commission in accordance with the conditions specified above. Notice of the effective date of suspension will be given respondent, who shall send his operator license to the office of the Commission in Washington, D. C., on or before the said effective date, or, if the effective date has passed at the time notice is received, the license shall be sent to the Commission forthwith.

EXAMINATIONS

§ 12.41. *When examination is required.* Examination is required for the issuance of a new amateur operator license, and for a change in class of operating privileges. Credit may be given, however, for certain elements of examination as provided in section 12.46.

§ 12.42. *Elements of examination.* The examination for amateur operator privileges comprises the following:

Element 1. Code test. Ability to send and receive, in plain language, messages in the International Morse Code at a speed of not less than 13 words per minute, free of omission or other error for a continuous period of at least 1 minute, during a test period of 5 minutes, counting 5 characters to the word, each numeral or punctuation mark counting as 2 characters.

Element 2. Amateur radio operation and apparatus, including telephone and telegraph.

Element 3. Provisions of treaties, statutes, and regulations affecting amateurs.

Element 4. Advanced amateur telephony.

§ 12.43. *Elements required for various privileges.* The examination for class A privileges will include all of the examination elements specified in section 12.42.

The examination for class B and class C privileges will include elements 1, 2, and 3 specified in section 12.42.

§ 12.44. *Manner of conducting examination.* The examinations for class A and class B privileges will be conducted by an authorized Commission employee or representative at locations and at times specified by the Commission.

Each examination for class C privileges will be conducted and supervised by not more than two volunteer examiners, whom the Commission may designate or permit the applicant to select; in the event the examiner for the code test is selected by the applicant, such examiner shall be the

holder of an amateur operator license with class A or B operating privileges, or shall have held, within the 5 years prior to the date of the examination, a commercial radiotelegraph operator license issued by the Commission or within that time shall have been employed in the service of the United States as the operator of a manually operated radiotelegraph station. The examiner for the written test shall be at least twenty-one years of age.

§ 12.45. *Additional examination for holders of class C operating privileges.* The Commission may require a licensee holding class C operating privileges to appear for a class B examination at a location designated by the Commission. If the licensee fails to appear for the class B examination when directed to do so, or fails to pass such examination, the class C operator license previously issued shall be subject to cancellation and, upon cancellation, a new license will not be issued for the class C privileges.

Whenever the holder of class C amateur operating privileges changes his actual residence or station location to a location where he would not have been eligible to apply for class C privileges in the first instance, or whenever a new examining location is established in an area within which the holder of class C amateur operating privileges would not have been eligible because of such examining location, to apply for class C privileges, such holder of class C privileges shall appear within 4 months thereafter at an examining location and time designated by the Commission and be examined for class B privileges. If, under such circumstances, the licensee fails to appear for the class B examination, or fails to pass such examination, the class C operator license previously issued shall be subject to cancellation and, upon cancellation, a new license will not be issued for the class C privileges.

§ 12.46. *Examination credit.* An applicant for class A privileges who holds an amateur operator license authorizing class B privileges will be required to pass only the examination element No. 4, advanced amateur telephony.

An applicant for class A privileges will be given credit for examination element 4 if within two years prior to the receipt of his application by the Commission he held class A privileges.

An applicant for any class of amateur privileges will be given credit for examination element one if within five years prior to the receipt of his application by the Commission he held a radiotelegraph first or second class operator license.

No examination credit for other classes of licenses or privileges shall be allowed.

A holder of an amateur operator license authorizing class C privileges will not thereby be accorded an abridged examination for either class B or class A privileges.

§ 12.47. *Examination procedure.* When taking an examination for amateur operator license, or for additional amateur operating privileges, the applicant shall write in longhand, by means of pen and ink. Diagrams shall be drawn either with pen and ink or with pencil; likewise, code tests shall be written with either pen and ink or with pencil. Applicants unable to comply with these requirements, because of physical disability, may dictate their answers to examination questions, and if unable to draw required diagrams, may dictate a detailed description essentially equivalent. If the examination or any part thereof is dictated, the examiner shall certify the nature of the applicant's disability and the name and address of the person(s) taking and transcribing the applicant's dictation.

§ 12.48. *Grading.* Code tests are graded as "passed" or "failed," separately for sending and receiving tests. Failure to pass the required code test for either sending or receiving will terminate the examination.

Seventy-four per cent is the passing grade for written examinations. For the purpose of grading, elements 2 and 3 (required for class B and class C privileges) are considered to be a single examination and element 4 (required, in addition to the other elements, for class A privileges) is considered to be a separate examination.

§ 12.49. *Eligibility for reexamination.* An applicant who fails examination for amateur operator privileges may not take another examination for such privileges within 30 days, except that this limitation shall not apply to an examination for class B operating privileges following an examination for class C privileges.

AMATEUR RADIO STATIONS

LICENSES

§ 12.61. *Eligibility for amateur station license.* A license for an amateur station will be issued in response to proper application therefor to a licensed amateur operator who has made a satisfactory showing of control of the transmitting station for which license is desired and of control of the specific premises upon which all of the station apparatus is to be located, at a designated fixed location. An amateur

station license may be issued to an individual, not a licensed amateur operator (other than an alien or a representative of an alien or of a foreign government), who is in charge of a proposed amateur station located in approved public quarters and established for training purposes in connection with the armed forces of the United States, but not operated by the United States Government.

§ 12.62. *Eligibility of corporations or organizations to hold license.* An amateur station license will not be issued to a school, company, corporation, association, or other organization, nor for their use except that in the case of a bona fide amateur radio organization or society a station license may be issued to a licensed amateur operator as trustee for such society.

§ 12.63. *Application for amateur station license.* (a) Each application for an amateur station license shall comply with the Commission's Rules and Regulations and shall be made in writing, subscribed and verified on Form 610 (application for amateur operator and/or station license). Form 602 should be used where the applicant is in charge of a proposed amateur station located in approved public quarters and established for training purposes in connection with the armed forces of the United States, but not operated by the United States Government.

(b) One application and all papers incorporated therein and made a part thereof shall be submitted for each amateur station license and shall be filed with the district field office of the Commission if personal appearance is required for operator examination in connection with the application for station license. If personal appearance is not required, the station application shall be sent to the Commission, Washington 25, D. C.

§ 12.64. *Location of station.* Only one fixed location will be authorized and designated in the license for each amateur station. Unless remote control of the transmitting apparatus is authorized, such apparatus shall be operated by a duly licensed amateur operator present at the location of such apparatus.

The granting of authority to operate by remote control is contingent upon the filing of a proper application, supported by (1) a showing of the applicant's control of the control point, (2) a description of the means which will be employed to control emission, (3) a description of the equipment and method for monitoring the emissions and (4) a statement of the precautions which will be taken to prevent access by unauthorized persons to the premises on which the controlled transmitting apparatus is located.

§ 12.65. *License period.* The license for an amateur station is valid normally for a period of 5 years from the date of issuance of a new, renewed, or modified license.

§ 12.66. *Authorized apparatus.* An amateur station license authorizes the use under control of the licensee of all transmitting apparatus at the fixed location specified in the station license which is operated on any frequency or frequencies allocated to the amateur service, and in addition authorizes the use, under control of the licensee, of portable and mobile transmitting apparatus operated at other locations.

§ 12.67. *Renewal of amateur station license.* An amateur station license may be renewed upon proper application filed not more than 120 days prior to date of expiration of such license and not later than the date of expiration.

§ 12.68. *Availability of station license.* The original license of each amateur station or a photo-copy thereof shall be posted in a conspicuous place in the room occupied by the licensed operator while the station is being operated at a fixed location or shall be kept in his personal possession. When the station is operated at other than a fixed location, the original station license or a photo-copy thereof shall be kept in the personal possession of the station licensee (or a licensed representative) who shall be present at the station while it is being operated as a portable or mobile station. The original station license shall be available for inspection by any authorized government official at all times while the station is being operated and at other times upon request made by an authorized representative of the Commission, except when such license has been filed with application for modification or renewal thereof, or has been mutilated, lost, or destroyed, and application has been made for a duplicate license in accordance with section 12.26.

§ 12.69. *Revocation of station license.* Whenever the Commission shall institute a revocation proceeding against the holder of any radio station license under section 312 (a), it shall initiate said proceeding by serving upon said licensee an order of revocation effective not less than 15 days after written notice thereof is given the licensee. The order of revocation shall contain a statement of the grounds and reasons for such proposed revocation and a notice of the licensee's right to be heard by filing with the Commission a

written request for hearing within 15 days after receipt of said order. Upon filing of such written request for hearing by said licensee the order of revocation shall stand suspended and the Commission will set a time and place for hearing and shall give the licensee and other interested parties notice thereof. If no request for hearing on any order of revocation is made by the licensee against whom such an order is directed within the time hereinabove set forth, the order of revocation shall become final and effective, without further action of the Commission. When any order of revocation has become final, the person whose license has been revoked shall forthwith deliver the station license in question to the inspector in charge of the district in which the licensee resides.

§ 12.70. *Modification of station license.* (a) Order to show cause—whenever the Commission shall determine that public interest, convenience, and necessity would be served, or any treaty ratified by the United States will be more fully complied with, by the modification of any radio station license either for a limited time, or for the duration of the term thereof, it shall issue an order for such licensee to show cause why such license should not be modified.

(b) Contents of order to show cause.—Such order to show cause shall contain a statement of the grounds and reasons for such proposed modification, and shall specify wherein the said license is required to be modified. It shall require the licensee against whom it is directed, to be and appear at a place and time therein named, in no event to be less than 30 days from the date of receipt of the order to show cause why the proposed modification should not be made and the order of modification issued.

(c) Failure to appear.—If the licensee against whom the order to show cause is directed does not appear at the time and place provided in said order, a final order of modification shall issue forthwith.

CALL SIGNALS

§ 12.81. *Assignment of call signal.* (a) The calls of amateur stations will be assigned systematically by the Commission with the following exceptions:

(1) A specific unassigned call may be reassigned to the most recent holder thereof;

(2) A specific unassigned call may be assigned to a previous holder if not under license during the past five years;

(3) A specific unassigned call may be assigned to an amateur organization in memoriam to a deceased member and former holder thereof;

(4) A specific call may be temporarily assigned to a station connected with an event, or events, of general public interest.

(b) An amateur call will consist of a sequence of 1 or 2 letters, a numeral designating the call area, and 2 or 3 letters. The call areas are as follows:

1—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

2—New York, New Jersey.

3—Pennsylvania, Delaware, Maryland, District of Columbia.

4—Virginia, North and South Carolina, Georgia, Florida, Alabama, Tennessee, Kentucky, Puerto Rico and Virgin Islands.

5—Mississippi, Louisiana, Arkansas, Oklahoma, Texas, New Mexico.

6—California, Hawaii and Pacific possessions except those included in area 7.

7—Oregon, Washington, Idaho, Montana, Wyoming, Arizona, Nevada, Utah, Alaska and adjacent islands.

8—Michigan, Ohio, West Virginia.

9—Wisconsin, Illinois, Indiana.

0—Colorado, Nebraska, North and South Dakota, Kansas, Minnesota, Iowa, Missouri.

§ 12.82. *Transmissions of call signals.* (a) An operator of an amateur station shall transmit the call of the station called or being worked and the call assigned the station which he is operating at the beginning and end of each transmission and at least once every 10 minutes during every transmission of more than 10 minutes' duration. In the case of stations conducting an exchange of several transmissions in sequence, with each transmission less than 3 minutes' duration, the call of the communicating stations need be transmitted only once every 10 minutes of operation as well as at the beginning and at the termination of the correspondence.

(b) In addition to complying with the requirements of paragraph (a) above, an operator of an amateur station operated as a portable or mobile station using radiotelegraphy shall transmit immediately after the call of such station, the fraction-bar character (DN) followed by the

number of the amateur call area in which the portable or mobile amateur station is then being operated, as for example:

Example 1. — Portable or mobile amateur station operating in the third amateur call area calls a fixed amateur station: W1ABC W1ABC W1ABC DE W2DEF DN 3 W2DEF DN 3 W2DEF DN 3 AR.

Example 2. — Fixed amateur station answers the portable or mobile amateur station: W2DEF W2DEF W2DEF DE W1ABC K.

Example 3. — Portable or mobile amateur station calls a portable or mobile amateur station: W3GHI W3GHI W3GHI DE W4JKL DN 4 W4JKL DN 4 W4JKL DN 4 AR.

When telephony is used, the call of the station shall be preceded by the words "this is" or the word "from" instead of the letters "de," followed by an announcement of the geographical location in which the portable or mobile station is being operated.

Example 4. — Portable or mobile amateur radiotelephone station operating in the third call area calls a fixed amateur station: W1ABC W1ABC W1ABC "this is" or the word "from" W2DEF W2DEF W2DEF operating portable (or mobile) three miles north of Bethesda, Maryland, over.

(c) When telephony is used, the transmission of call prescribed by subsections (a) and (b) of this section may be made by the person transmitting by voice in lieu of a duly licensed operator provided the licensed operator maintains the control required by section 12.28.

(d) When using telephony phonetic aids to identify the call of the station may be employed. To avoid confusion, however, the names of countries, states, or cities shall not be used for this purpose.

PORTABLE AND MOBILE STATIONS

§ 12.91. *Requirements for portable and mobile operation.* An amateur station may be operated as a portable station on any authorized amateur frequency and as a mobile station on any authorized amateur frequency above 25 Mc.

§ 12.92. *Special provisions for portable stations.* Prior to operating an amateur station as a portable station, the licensee shall give written notice to the inspector in charge of the district in which the portable operation is intended. This notice shall state the station call, the name of the licensee, the date or dates of proposed operation, and the contemplated portable station location as specifically as possible. An amateur station operated under the provisions of this section shall not be operated during any period exceeding 1 month without giving additional notice to the inspector in charge of the radio inspection district in which the station is intended to be further operated, nor for more than 4 consecutive periods of 1 month each at the same location. This section does not apply to operation on frequencies above 25 Mc.

§ 12.93. *Special provisions for non-portable stations.* The specific provisions of these rules relative to portable stations are not applicable to a non-portable station except that —

(a) An amateur station that has been moved from one permanent location to another permanent location may be operated at the latter location, in accordance with the provisions governing portable stations (including notice to the inspector in charge of the district in which the station is located) for a period not exceeding 4 consecutive months, but in no event beyond the expiration date of the license, provided a formal application for modification of license to change the permanent location has been filed with the Commission.

(b) The licensee of an amateur station who changes residence temporarily and moves his amateur station to a temporary location associated with his temporary residence, or the licensee-trustee for an amateur radio society which changes the normal location of its amateur station to a different and temporary location may use the station at the temporary location if the station is to remain there for a period of not more than 4 months and the following requirements are met:

(1) Similar notice in writing shall be given by the amateur station licensee or licensee-trustee to the Commission in Washington, D. C., and to the inspector in charge of the district in which the station is to be temporarily operated.

(2) Similar notice shall be given for each change in station location and for transfer of the station to the former permanent location, or to a new permanent location, before the transmitting apparatus is operated.

(c) When the station is operated under the provisions of this section the calling procedure specified in section 12.82 shall be used, including transmissions of the fractional bar character when telegraphy is used followed by the number of the amateur call area in which the station is being operated.

ated. When telephony is used, an announcement shall be made of the geographical location in which the station is being operated.

USE OF AMATEUR STATIONS

§ 12.101. *Points of communications.* An amateur station may be used to communicate only with other amateur stations, except that in emergencies or for test purposes it may also be used temporarily for communication with other classes of stations licensed by the Commission, and with United States Government stations. Amateur stations may also be used to communicate with any radio station other than amateur which is authorized by the Commission to communicate with amateur stations. Amateur stations may be used also for transmitting signals, or communications, or energy, to receiving apparatus for the measurement of emissions, temporary observation of transmission phenomena, radio control of remote objects, and for similar experimental purposes.

§ 12.102. *No remuneration for use of station.* An amateur station shall not be used to transmit or receive messages for hire, nor for communication for material compensation, direct or indirect, paid or promised.

§ 12.103. *Broadcasting prohibited.* An amateur station shall not be used for broadcasting any form of entertainment, nor for the simultaneous retransmission by automatic means of programs or signals emanating from any class of station other than amateur.

§ 12.104. *Radiotelephone tests.* The transmission of music by an amateur station is forbidden. However, single audio-frequency tones may be transmitted for test purposes of short duration for the development and perfection of amateur radiotelephone equipment.

ALLOCATION OF FREQUENCIES *

§ 12.111. *Frequencies for use of amateur stations.* (a) The following bands of frequencies are allocated for use by amateur stations:

| (1) Below 25 Mc. | (2) Above 25 Mc. |
|----------------------|----------------------|
| 1,750 to 2,050 kc. | 28 to 29.7 Mc. |
| 3,500 to 4,000 kc. | 50 to 54 Mc. |
| 7,000 to 7,300 kc. | 144 to 148 Mc. |
| 14,000 to 14,400 kc. | 1,215 to 1,295 Mc. |
| | 2,300 to 2,450 Mc. |
| | 5,250 to 5,650 Mc. |
| | 10,000 to 10,500 Mc. |
| | 21,000 to 22,000 Mc. |

(b) The band of frequencies 420 to 450 Mc. is allocated for use by amateur stations (and temporarily by other services for special air navigational aids) subject to the limitation of 50 watts peak antenna power.

(c) The band of frequencies 235 to 240 Mc. is allocated for use by amateur stations until January 1, 1949; the frequency band 220 to 225 Mc. is allocated for use by amateur stations beginning January 1, 1949.

(d) Amateur stations may be operated with types A-0, A-1, A-2, A-3, A-4 and special emission for frequency modulation on the frequency band 27.185-27.455 Mc. (allocated for operation of scientific, industrial and medical apparatus).

§ 12.112. *Use of frequencies above 30,000 Mc.* Licensed amateur stations may be operated, subject to further order of the Commission, with any type of emission authorized for amateur stations, on any frequency or frequencies above 30,000 Mc.

§ 12.113. *Individual frequency not specified.* Transmissions by an amateur station may be on any frequency within any authorized amateur band. Sideband frequencies resulting from keying or modulating a carrier wave shall be confined within the authorized amateur band.

§ 12.114. *Types of emission.* All bands of frequencies allocated to the amateur service may be used for the transmission of type A-1 emission, and for type A-0 emission for short periods of time when required for authorized remote control purposes or for experimental purposes.

* The frequencies specified in these rules may not be used by amateurs except pursuant to and subject to the limitations and restrictions prescribed by Commission Orders. The frequencies and types of emission which may be used by amateurs as of April 1, 1946, 3:00 A.M., Eastern Standard Time, are prescribed in Commission Order No. 130-D. The use of additional frequencies will be authorized from time to time by modification of Order No. 130-D. The assignment and use of all frequencies below 25 Mc. contained in these regulations are subject to change in accordance with the Commission's final report of allocations below 25 Mc., in Docket Proceedings No. 6651.

§ 12.115. *Frequency bands for additional types of emission using amplitude modulation.* The following additional types of emissions using amplitude modulation may be used on the following bands of frequencies:

| | | |
|------------------|--------------------------|--------------------|
| 28.1 to 50 | 29.7 Mc. to 54 Mc. | — A-3 — — |
| 144 to 235 | 148 Mc. to 240 Mc. | A-2, A-3, A-4 — |
| 420 to 1,215 | 450 Mc. to 1,295 Mc. | A-2, A-3, A-4 — |
| 2,300 to 5,250 | 2,450 Mc. to 5,650 Mc. | A-2, A-3, A-4, A-5 |
| 10,000 to 21,000 | 10,500 Mc. to 22,000 Mc. | A-2, A-3, A-4, A-5 |

Any type of emission may be used by amateur stations on amateur frequency bands above 1215 Mc.

§ 12.116. *Additional bands for radiotelephony.* Amateur stations may be used for radiotelephony with amplitude modulation (type A-3 emission) in the frequency bands 3900 to 4000 kc. and 14,150 to 14,250 kc., provided the station is licensed to a person who holds an amateur operator license endorsed for class A operating privileges, and actual operation and control of the station is maintained by an operator holding class A privileges.

§ 12.117. *Frequency modulation.* The following bands of frequencies may be used by amateur stations for frequency-modulated radiotelephone transmissions and for radiotelegraph transmissions employing carrier shift or other frequency modulation techniques:

| | | | |
|--------------|--------------------|-----------------|-------------------------|
| 29 to 52.5 | 29.7 Mc. to 54 Mc. | 1,215 to 2,300 | 1,295 Mc. to 2,450 Mc. |
| 144 to 235 | 148 Mc. to 450 Mc. | 5,250 to 10,000 | 5,650 Mc. to 10,500 Mc. |
| 420 to 5,250 | 450 Mc. to 21,000 | 22,000 | 22,000 Mc. |

EQUIPMENT AND OPERATION

§ 12.131. *Maximum authorized power.* Except on frequencies within the band 420–450 Mc. (where peak antenna power shall not exceed 50 watts), each amateur transmitter may be operated with a power input not exceeding 1 kilowatt to the plate circuit of the final amplifier stage of an amplifier-oscillator transmitter or to the plate circuit of an oscillator transmitter. An amateur transmitter operating with a power input exceeding 900 watts to the plate circuit shall provide means for accurately measuring the plate power input to the vacuum tube or tubes supplying power to the antenna.

§ 12.132. *Power supply to transmitter.* The licensee of an amateur station using frequencies below 144 Mc. shall use adequately filtered direct-current plate power supply for the transmitting equipment to minimize modulation from this source.

§ 12.133. *Purity and stability of emissions.* Spurious radiation from an amateur station being operated with a carrier frequency below 144 Mc. shall be reduced or eliminated in accordance with good engineering practice. This spurious radiation shall not be of sufficient intensity to cause interference in receiving equipment of good engineering design including adequate selectivity characteristics, which is tuned to a frequency or frequencies outside the frequency band of emission normally required for the type of emission being employed by the amateur station. In the case of A-3 emission, the amateur transmitter shall not be modulated to the extent that interfering spurious radiation occurs, and in no case shall the emitted carrier wave be amplitude-modulated in excess of 100 per cent. Means shall be employed to insure that the transmitter is not modulated in excess of its modulation capability for proper technical operation. For the purposes of this section a spurious radiation is any radiation from a transmitter which is outside the frequency band of emission normal for the type of transmission employed, including any component whose frequency is an integral multiple or submultiple of the carrier frequency (harmonics and subharmonics), spurious modulation products, key clicks and other transient effects, and parasitic oscillations. When

using amplitude modulation on frequencies below 144 Mc., simultaneous frequency modulation is not permitted and when using frequency modulation on frequencies below 144 Mc. simultaneous amplitude modulation is not permitted. The frequency of the emitted carrier wave shall be as constant as the state of the art permits.

§ 12.134. *Modulation of carrier wave.* Except for brief tests or adjustments, and except for operation in the band 27.185 to 27.455 Mc., an amateur radiotelephone station shall not emit a carrier wave on frequencies below 144 Mc. unless modulated for the purpose of communication.

§ 12.135. *Frequency measurement and regular check.* The licensee of an amateur station shall provide for measurement of the emitted carrier frequency or frequencies and shall establish procedure for making such measurement regularly. The measurement of the emitted carrier frequency or frequencies shall be made by means independent of the means used to control the radio frequency or frequencies generated by the transmitting apparatus and shall be of sufficient accuracy to assure operation within the amateur frequency band used.

§ 12.136. *Logs.* Each licensee of an amateur station shall keep an accurate log of station operation, including the following:

(a) The date and time of each transmission. (The date need only be entered once for each day's operation. The expression "time of each transmission" means the time of making a call and need not be repeated during the sequence of communication which immediately follows; however, an entry shall be made in the log when signing off so as to show the period during which communication was carried on.)

(b) The signature of each licensed operator who manipulates the key of a radiotelegraph transmitter or the signature of each licensed operator who operates a transmitter of any other type and the name of any person not holding an amateur operator license who transmits by voice over a radiotelephone transmitter. The signature of the operator need only be entered once in the log, in those cases when all transmission are made by or under the supervision of the signatory operator, provided a statement to that effect also is entered. The signature of any other operator who operated the station shall be entered in the proper space for that operator's transmission.

(c) Call of the station called. (This entry need not be repeated for calls made to the same station during any sequence of communication, provided the time of signing off is given.)

(d) The input power to the oscillator, or to the final amplifier stage where an oscillator-amplifier transmitter is employed. (This need be entered only once, provided the input power is not changed.)

(e) The frequency band used. (This information need be entered only once in the log for all transmission until there is a change in frequency to another amateur band.)

(f) The type of emission used. (This need be entered only once until there is a change in the type of emission.)

(g) The location of the station (or the approximate geographical location of a mobile station) at the time of each transmission. (This need be entered only once provided the location of the station is not changed. However, suitable entry shall be made in the log upon changing the location. Where operating at other than a fixed location, the type and identity of the vehicle or other mobile unit in which the station is operated shall be shown.)

(h) The message traffic handled. (If record communications are handled in regular message form, a copy of each message sent and received shall be entered in the log or retained on file at the station for at least 1 year.)

§ 12.137. *Retention of logs.* The log shall be preserved for a period of at least 1 year following the last date of entry. The copies of record communications and station log required by section 12.136 shall be available for inspection by authorized representatives of the Commission.

SPECIAL CONDITIONS

§ 12.151. *Additional conditions to be observed by licensee.* In all respects not specifically covered by these regulations each amateur station shall be operated in accordance with good engineering and good amateur practice.

§ 12.152. *Restricted operation.* (a) If the operation of an amateur station causes general interference to the reception of transmissions from stations operating in the domestic broadcast service when receivers of good engineering design including adequate selectivity characteristics are used to receive such transmissions and this fact is made known to the amateur station licensee, the amateur station shall not be operated during the hours from 8 o'clock P.M. to 10:30 P.M., local time, and on Sunday for the additional period from 10:30 A.M. until 1 P.M., local time, upon the frequency or frequencies used when the interference is created. (b) In general, such steps as may be necessary to minimize interference

EDITOR'S NOTE: The types of emission referred to in the amateur rules are as follows:

- Type A0 — Steady, unmodulated, pure carrier.
- Type A1 — Telegraphy on pure continuous waves.
- Type A2 — Amplitude tone-modulated telegraphy.
- Type A3 — Amplitude-modulated telephony.
- Type A4 — Facsimile.
- Type A5 — Television.

The foregoing assumes modulation or possible keying in amplitude only. There is as yet no extension of this list to embrace frequency-modulated transmissions, which are separately mentioned in the rules.

to stations operating in other services may be required after investigation by the Commission.

§ 12.153. *Second notice of same violation.* In every case where an amateur station licensee is cited within a period of twelve consecutive months for the second violation of the provisions of sections 12.111, 12.113, 12.115, 12.116, 12.117, 12.132, or 12.133, the station licensee, if directed to do so by the Commission, shall not operate the station and shall not permit it to be operated from 6 P.M. to 10:30 P.M., local time, until written notice has been received authorizing the resumption of full-time operation. This notice will not be issued until the licensee has reported on the results of tests which he has conducted with at least two other amateur stations at hours other than 6 P.M. to 10:30 P.M., local time. Such tests are to be made for the specific purposes of aiding the licensee in determining whether the emissions of the station are in accordance with the Commission's rules. The licensee shall report to the Commission the observations made by the cooperating amateur licensees in relation to the reported violations. This report shall include a statement as to the corrective measures taken to insure compliance with the rules.

§ 12.154. *Third notice of same violation.* In every case where an amateur station licensee is cited within a period of twelve consecutive months for the third violation of sections 12.111, 12.113, 12.115, 12.116, 12.117, 12.132 or 12.133, the station licensee, if directed by the Commission, shall not operate the station and shall not permit it to be operated from 8 A.M. to 12 midnight, local time, except for the purposes of transmitting a prearranged test to be observed by a monitoring station of the Commission to be designated in each particular case. The station shall not be permitted to resume operation during these hours until the licensee is authorized by the Commission, following the test, to resume full-time operation. The results of the test and the licensee's record shall be considered in determining the advisability of suspending the operator license or revoking the station license, or both.

§ 12.155. *Answers to notices of violations.* Under title III of the act. — Any licensee receiving official notice of a violation of the terms of the Communications Act of 1934, any legislative act, Executive order, treaty to which the United States is a party, or the Rules and Regulations of the Federal Communications Commission, shall, within 3 days from such receipt, send a written answer direct to the Federal Communications Commission at Washington, D. C., and a copy thereof to the office of the Commission originating the official notice when the originating office is other than the office of the Commission in Washington, D. C.: Provided, however, That if an answer cannot be sent nor an acknowledgment made within such 3-day period by reason of illness or other unavoidable circumstances, acknowledgment and answer shall be made at the earliest practicable date with a satisfactory explanation of the delay. The answer to each notice shall be complete in itself and shall not be abbreviated by reference to other communications or answers to other notices. If the notice relates to some violation that may be due to the physical or electrical characteristics of transmitting apparatus, the answer shall state fully what steps, if any, are taken to prevent future violations, and if any new apparatus is to be installed, the date such apparatus was ordered, the name of the manufacturer, and promised date of delivery. If the notice of violation relates to some lack of attention or improper operation of the transmitter, the name of the operator in charge shall be given.

§ 12.156. *Operation in emergencies.* In the event of widespread emergency conditions affecting domestic communication facilities, the Commission may confer with representatives of the amateur service and others, and if deemed advisable, declare that a state of general communications emergency exists, designating the area or areas concerned (normally not exceeding 1,000 miles from center of the affected area), whereupon it shall be incumbent upon each amateur station in such area or areas to observe the following restrictions for the duration of such emergency:

(a) Transmissions, other than those relating to relief work or other emergency service, such as amateur station networks can provide, shall not be made within the 1750-2050-kc. or 3500-4000-kc. bands. Incidental calling, testing and working, including casual conversation or remarks not pertinent or necessary to constructive handling of the emergency situation, shall be prohibited.

(b) Frequencies within the bands 2025-2050 kc., 3500-3525 kc. and 3975-4000 kc. shall be reserved for emergency calling channels, for initial calls from isolated stations or first calls concerning very important emergency relief matters or arrangements. All stations having occasion to use such channels shall change, as quickly as possible, to other frequencies for carrying on their communications.

(c) A 5-minute listening period for the first 5 minutes of

each hour shall be uniformly observed for initial calls of major importance, both in the designated emergency calling channels and throughout the 1750-2050-kc. and 3500-4000-kc. bands. Only stations isolated or engaged in handling official traffic of the highest priority may continue with transmissions in these listening periods. No replies to calls or resumption of routine traffic shall be made in the 5-minute listening periods.

(d) The Commission may designate certain amateur stations to assist in promulgation of its emergency announcement, to police the 1750-2050-kc. and 3500-4000-kc. bands and to warn non-complying stations observed to be operating therein. The operators of these observing stations shall report fully to the Commission the identity of any stations failing to comply, after notice, with any of the pertinent provisions of this section. Such designated stations will act in an advisory capacity when able to provide information on emergency circuits. Their policing authority shall be limited to the transmission of information from responsible official sources, and full reports of non-compliance which may serve as a basis for investigation and action under section 502 of the Communications Act. Such policing authority shall apply only to the 1750-2050-kc. and 3500-4000-kc. bands. Individual policing transmissions shall refer to this section of the rules by number (12.156) and shall specify briefly and concisely the date of the Commission's declaration and the area and nature of the emergency. Policing observer stations shall not enter into discussions with other stations beyond the furnishing of essential facts relative to the emergency.

(e) The special conditions imposed under this section will cease to apply only after the Commission shall have declared such emergency to be terminated.

§ 12.157. *Obscenity, indecency, profanity.* No licensed radio operator or other person shall transmit communications containing obscene, indecent, or profane words, language, or meaning.

§ 12.158. *False signals.* No licensed radio operator shall transmit false or deceptive signals or communications by radio, or any call letter or signal which has not been assigned by proper authority to the radio station he is operating.

§ 12.159. *Unidentified communications.* No licensed radio operator shall transmit unidentified radio communications or signals.

§ 12.160. *Interference.* No licensed radio operator shall willfully or maliciously interfere with or cause interference to any radio communication or signal.

§ 12.161. *Damage to apparatus.* No licensed radio operator shall willfully damage, or cause or permit to be damaged, any radio apparatus or installation in any licensed radio station.

§ 12.162. *Fraudulent licenses.* No licensed radio operator or other person shall obtain or attempt to obtain, or assist another to obtain or attempt to obtain, an operator license by fraudulent means.

TEMPORARY F.C.C. ORDERS

ORDER NO. 75-D

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 23rd day of January, 1946;

The Commission having under consideration its Order 75, dated June 18, 1940, and the amendments thereto, namely, Order 75-A, dated August 6, 1940; Order 75-B, dated September 5, 1940, and Order 75-C, dated April 27, 1943; and

IT APPEARING, That the extensive requirements of Order 75 with respect to information concerning citizenship may now be modified;

IT IS HEREBY ORDERED, That:

1) On and after the date of this Order, each application for a new commercial or amateur radio operator license, or a renewal of such license shall be accompanied by FCC Form No. 735-A, bearing the applicant's fingerprints and the information requested thereon, unless a Form 735-A in satisfactory condition has previously been submitted by the applicant.

2) On and after the date of this Order, every person who holds an outstanding commercial or amateur radio operator license issued by this Commission and every person who shall apply or whose application is pending for such a license, or a renewal thereof, shall furnish such information as the Commission may in writing request bearing upon his qualifications to hold an operator license, including any

showing made with respect to citizenship.

3) Orders 75, 75-A, 75-B, and 75-C are cancelled.

ORDER NO. 77-E

At a meeting of the Federal Communications Commission held at its offices in Washington, D. C., on the 28th day of November, 1945;

The Commission having under consideration its Rules Governing Amateur Radio Stations and Operators and its Rules Governing Commercial Radio Operators, with particular reference to the provisions concerning renewals; and

IT APPEARING, That present conditions render it difficult for amateur radio station licensees, amateur radio operators, and commercial radio operators to make a showing of service or use required for renewal of license; and that such difficulty will be accentuated in many cases due to military service;

IT IS ORDERED, That Sections 12.26 and 12.66 of the Rules Governing Amateur Radio Stations and Operators, and Section 13.28 of the Rules Governing Commercial Radio Operators, in so far as the required showing of service or use of license is concerned, BE, AND THEY ARE HEREBY, SUSPENDED until further order of the Commission, but in no event beyond June 30, 1946.

This order shall become effective January 1, 1946.

ORDER NO. 115

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 25th day of May, 1943:

WHEREAS, present conditions render it difficult for amateur radio operators who are in the military service of the United States or engaged in war work at locations distant from their homes to ascertain the expiration dates of their amateur radio operator licenses and to make timely and proper application for their renewal; and

WHEREAS, no person is presently authorized to engage in any amateur radio station operation in the continental United States, its territories and possessions under the provisions of Commission Orders 87 and 87-A adopted December 8, 1941, and January 8, 1942, respectively; and

WHEREAS, the Commission has, under Order 87-B adopted September 15, 1942, discontinued the issuance of renewed or modified amateur radio station licenses but has continued, at the request of the military, to issue new or renewed operator licenses;

IT IS ORDERED THAT:

1. Every amateur radio operator license which by its terms expired during the period December 7, 1941, to May 25, 1943, inclusive, and has not been renewed, BE, AND THE SAME IS HEREBY REINSTATED, and the license term thereof IS HEREBY EXTENDED for a period of three years from the date of expiration provided therein.

2. The license term of every amateur radio operator license which by its terms expires during the period May 26, 1943, to December 7, 1944, inclusive, BE, AND THE SAME IS HEREBY EXTENDED, for a period of three years from the date of expiration provided therein.

PROVIDED HOWEVER, That the provisions of this Order shall not apply to any amateur radio operator license which has been, or may hereafter be, finally suspended by Commission Order, or has been voluntarily surrendered by the licensee, or to any amateur radio operator licensee who has failed to comply with Commission Order No. 75, as amended.

3. The provisions of Section 12.26 of the Rules and Regulations to the extent that they are inconsistent with the provisions of this Order are hereby suspended until further order of the Commission.

ORDER NO. 115-A

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 28th day of November, 1944: WHEREAS, . . . IT IS ORDERED, That:

1. Every amateur radio operator license which by its terms expired during the period December 7, 1941, to December 7, 1942, inclusive, but the duration of which has been extended by Commission Order No. 115 for a period of three years from the date of expiration provided therein, is ex-

tended for a period of one year from the date of expiration as extended by Order 115.

2. Every amateur radio operator license issued during the period December 7, 1941, to December 7, 1942, inclusive, is hereby extended for a period of one year from the date of expiration provided therein.

Provided, however, . . . (Rest of order same as Order 115.)

ORDER NO. 115-B

At a meeting of the Federal Communications Commission held at its offices in Washington, D. C., on the 28th day of November, 1945;

WHEREAS, The Commission has, pursuant to Order No. 115, adopted May 25, 1943, reinstated and extended for a period of three years from their expiration dates certain amateur radio operator licenses which by their terms had expired or would expire between December 7, 1941 and December 7, 1944; and

WHEREAS, The Commission has, pursuant to Order No. 115-A, adopted November 28, 1944, extended for a period of one year from their expiration dates certain amateur radio operator licenses which by their terms or by virtue of extensions provided by Order No. 115 would have expired between December 7, 1944 and December 7, 1945; and

WHEREAS, The conditions which made necessary the adoption of said Orders Nos. 115 and 115-A continue to exist during the present period of demobilization and readjustment;

IT IS ORDERED THAT:

Every amateur radio operator license which, either by its own terms or as extended by Orders Nos. 115 and 115-A, would expire during the period December 7, 1945, and December 7, 1946, is hereby extended for a period of one year from the date on which it would otherwise expire.

PROVIDED, HOWEVER, That the provisions of this order shall not apply to any amateur radio operator license that has been or may hereafter be finally suspended by Commission order, or voluntarily surrendered by the licensee, nor to any amateur radio operator licensee who fails or has failed to comply with provisions of the Commission's Order No. 75 as amended.

ORDER NO. 130-F

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 17th day of April, 1946;

WHEREAS, the Commission has, pursuant to Order No. 130 adopted November 9, 1945, and Order No. 130-A adopted November 14, 1945, validated certain amateur station licenses for a 6-month period commencing November 15, 1945, and ending May 15, 1946; and

WHEREAS, the Commission has, pursuant to Order No. 115 adopted May 25, 1943, Order No. 115-A adopted November 28, 1944, and Order No. 115-B adopted November 28, 1945, reinstated and extended certain amateur operator licenses so that the expiration dates of these amateur operator licenses will fall within the period December 8, 1946, and December 7, 1947; and

WHEREAS, it is now desirable to extend the validation period for amateur station licenses and to make the term of each validated amateur station license concurrent with the term of the amateur operator license held by the licensee of the station;

IT IS ORDERED THAT the first ordering clause of Order No. 130 and Order No. 130-A be and it is hereby amended to read as follows:

1. Each amateur radio station license which was valid at any time during the period December 7, 1941, to September 15, 1942, and which has not heretofore been revoked, is hereby validated for the term, as extended, of the amateur radio operator license held by the licensee of the station.

This Order shall become effective immediately.

ORDER NO. 132

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 10th day of April, 1946:

WHEREAS, the large number of new and renewal amateur station and operator license applications recently filed with the Commission have made their prompt processing difficult; and

WHEREAS, many amateur station licensees have changed their station location since the issuance of their station licenses and now operate from new fixed locations, making it difficult for the Commission to communicate with them; and

WHEREAS, the provisions of Sec. 12.92 of the Commission's rules exempt all amateurs who operate portable stations on frequencies above 25 Mc. from the requirement of notice concerning their intended operations; and

WHEREAS, the provisions of Sec. 12.93 (a) of the Commission's rules are not presently adequate to regulate the operation of nonportable amateur radio stations at permanent locations other than those specified in the station licenses;

IT IS ORDERED THAT:

(1) The provision in Sec. 12.92 of the Commission's rules exempting amateur radio station licensees who operate portable stations on frequencies above 25 Mc. from the requirements of prior notice to the district inspector where operation is intended is suspended until further order of the Commission. On and after the date of this order, the operation of portable stations on frequencies above 25 Mc. shall be subject to the same requirements of prior notice as are specified for the operation of portable stations on frequencies below 25 Mc. in Sec. 12.92.

(2) The provisions of Sec. 12.93 (a) of the Commission's rules regarding the operation of nonportable stations which have been moved from one permanent location to another not specified in the station license, are suspended until further order of the Commission.

(3) The licensee of an amateur radio station may, on and after the date of this order, commence operation at a per-

manent location other than that specified in the station license if advance written notice is given to the inspector in charge of the district for which the station license was issued, and to the inspector in charge of the district in which the operation (on frequencies below or above 25 Mc.) is intended of the following particulars: the station call, the name of the licensee, and the proposed station location.

(4) The licensee of an amateur radio station who is now operating at a permanent location other than that specified in the station license may continue such operation if, within 30 days of the date of this order, written notice is given to the inspector in charge of the district for which the station license was issued, and to the inspector in charge of the district in which the station is being operated (on frequencies below or above 25 Mc.) of the following particulars: the station call, the name of the licensee, and the station location.

(5) The operator of an amateur station located at a permanent location other than that specified in the station license shall follow the calling procedure referred to in Sec. 12.93 (c).

This order shall become effective immediately.

CANADA

The frequency bands and general privileges of amateurs in the Dominion of Canada closely parallel those in the United States. However, there is no counterpart in Canada of the extensive U. S. regulations; matters are considerably simpler there. Canadian aspirants to amateur licenses can get full information from the nearest radio inspector or by writing direct to the Radio Division, Department of Transport, at Ottawa.

TEMPORARY CHANGES

(Continued from page 9)

§12.27 of the amateur rules for a proof of use of an operator license as a condition to its renewal. The waiver will rather surely be further extended. ARRL is advised by FCC that no proof of use will be required for the first postwar renewals of prewar licenses. Thus the new requirement that the three contacts cited for renewal must be by telegraphy is not likely to become operative during 1946, nor indeed until ample time has been allowed for renewing prewar licenses.

Order 132, to be found near the end of this booklet, on April 10th suspended the waiver of advance notice for true portable operation on frequencies above 25 Mc. Advance notice of portable operation, for any band whatever, must now be sent the inspector in whose district the operation will occur. Mobile operation is not affected.

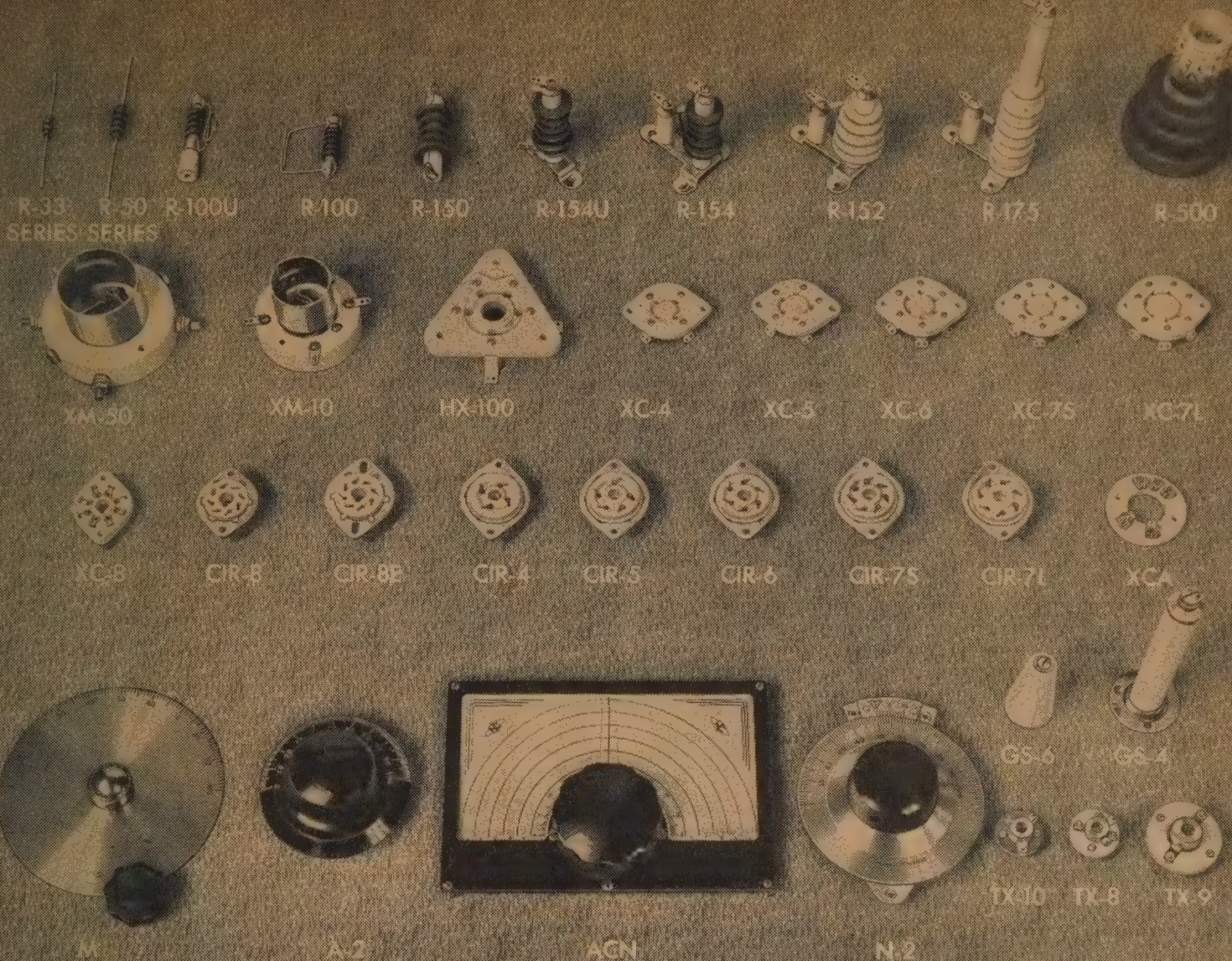
The same order made another temporary change of importance to the thousands of amateurs not now operating at the ad-

resses shown on their current licenses. The provisions in §12.93 (a) for "fixed-portable" operation were temporarily suspended and a new procedure established: such amateurs must send notices of their present location both to the inspector of the district in which they were licensed and the inspector of the district in which they now operate. This applies for any frequency band whatever. Monthly notices are not required, and additional notices are not necessary unless address is again changed. The inspectors' districts do not coincide with call areas. The inspectors to be notified are those whose districts include the counties in question; see list on inside rear cover of this booklet. Such amateur stations must continue to sign their calls in a manner to indicate portable status, the indicator to be in terms of the new call areas per §12.81 (b). Applications for modification, to escape the necessity for signing the portable indicator, cannot yet be entertained by FCC.

INDEX

(In the references, whole numbers such as 1, 3, 7, etc., represent page numbers in the manual; decimal numbers preceded by § indicate section numbers in the FCC amateur rules; a reference made to the Act means the quoted section will be found in the extracts from the Communications Act of 1934, preceding the regulations in the rear of the booklet.)

- Activity required for operator license renewal 9, §12.27, Order 77-E
- Advance notice, portable, and other, operation 2, §12.92, §12.93, Order 132
- Alaska 5
- Amateur bands 9, §12.111, §12.112
- Amateur operator, definition of §12.2
- Amateur radio communication, definition of §12.6
- Amateur radio communication restricted 9
- Amateur regulations 24-29
- Amateur service, definition of §12.1
- Amateur station, definition of §12.3
- Amateur station, who may operate 1, 2, §12.28
- Amplitude modulation, bands for §12.115
- Applications, filing of 5, 9, §12.22
- Assignment of calls §12.81
- Authorized apparatus §12.66
- Availability of operator license 1, §12.25
-
- Bands, amateur 9, §12.111, §12.112
- Broadcasting prohibited §12.103
- Broadcast listener interference §12.152
-
- Call areas §12.81
- Calling channels, emergency §12.156
- Calling procedure §12.82
- Call letter assignment §12.81
- Call signals, transmission of §12.82
- Canada 31
- Canal Zone Act. Sec. 2 (a)
- Citizenship 1, 5, Order 75-D
- Class A 6, 17
- Class A privileges 3, §12.23, §12.116
- Class C:
 - Additional examination, when required §12.45
 - Code test 5, §12.44
 - Examiner requirements 4, §12.44
- Classes of license 3, §12.21
- Club licenses §12.62
- Combination license 1
- Communications Act, excerpts 22
- Compensation prohibited §12.102
- Control of premises 2, §12.61, §12.64
-
- Disability, physical 5, §12.21, §12.47
- "Duplex," radiotelephone operation §12.134
- Duplicate license §12.26
-
- Eligibility:
 - For operator license 1, §12.21
 - For reexamination 3, 5, §12.61
 - For station license §12.61, §12.62
- Emergency operation §12.156
- Examining points 4, front cover
- Examination elements §12.42
- Examinations:
 - Additional, for Class C §12.45
 - Code test §12.42, §12.48
 - Credit §12.46
 - Elements required §12.43
 - Eligibility for reexamination §12.61
 - Examiner requirements 4, §12.44
 - Grading §12.48
 - Operator 3, 4, 7
 - Points where given 4, front cover
 - Procedure 3-6, §12.44, §12.47
 - When required §12.41
- Exemptions, operator license applications 7, §12.46
- Expeditions, communication with §12.101
- Experimental uses of amateur stations §12.101
- Expiration time and periods, licenses §12.29, §12.65
- Extension of operator licenses 9, Orders 115, §115-A, §115-B
-
- False signals prohibited §12.158, Act Sec. 325 (a)
- Federal Communications Commission:
 - Authority for Act Sec. 1
 - Composition of Act Sec. 4(a)
 - Duties and powers Act Sec. 303
 - Examination points 4, front cover
- Filing time, renewals 9, §12.27
- Fingerprints 5, Order 75-D
- "Fixed Portable" operation 2, §12.93, Order 132
- Frequency measurement required §12.135
- Frequency modulation, bands for §12.117
-
- Grading examination §12.48
- Guam 5
-
- Harmonics §12.133
- Hawaii 5
- Hearings, right to request §12.30, §12.31, §12.32
-
- Input power, maximum §12.131
- Interference, prevention of §12.133, §12.160
-
- Key clicks §12.133
-
- Learning the code 3
- Licenses required 1
- License term 2, 3, §12.29
- Listening period, emergency §12.156 (c)
- Logs:
 - Availability for inspection §12.137
 - Entries §12.136
 - Preservation of §12.137
-
- Mail examination (Class C) 3, 4, §12.44
- Measurement of input §12.131
- Message traffic record §12.136 (h)
- Military posts 3, §12.21, §12.61
- Minimum power required Act Sec. 324
- Mobile operation 2, §12.82, §12.91
- Modifications 6, §12.70, Order 132
- Modifications, temporary use of portable procedure §12.93 (a)
- Modulation limit §12.133
- Moving into Class B area 3, 7, §12.45
- Multiple choice questions 7-8
- Music transmission forbidden §12.104
-
- Naval posts 3, §12.21, §12.61
- Notices of violation §12.152, §12.153, §12.154
-
- Observing stations, emergency §12.155 (d)
- One-way transmissions §12.101
- Operator authority 3, §12.24
- Operator license:
 - Application for §12.22
 - Availability of 3, §12.25
 - Duplicate §12.26
 - Eligibility for 1, §12.21
 - Extensions of Orders 115, §115-A, §115-B
 - Privileges 3, §12.23
 - Renewal 6, 9, §12.27
 - Scope of authority §12.24
 - Suspension §12.30, §12.31
 - Term §12.29
- Operating privileges §12.23
- Operation of fixed station at temporary location §12.93 (b), Order 132
- Operation while renewal pending 6, §12.25, §12.68
-
- Penalties Act Sec. 501, 502
- Philippines Act Sec. 2 (a)
- Photo-copies of licenses 2, §12.25, §12.68
- Physical disability 5, §12.21, §12.47
- Policing authority, emergency §12.155 (d)
- Portable and Mobile operation:
 - Advance notice §12.92, Order 132
 - Availability of licenses 2, §12.68
 - Calling procedure §12.82
 - Definitions of §12.4, §12.5
 - Logs §12.136
 - Privileges 2, §12.91, Order 132
- Portable procedure, use of:
 - At temporary location of fixed station 2, §12.93 (b), Order 132
 - While awaiting modification 2, §12.93 (a), Order 132
- Portable signing procedure §12.82
- Posting of license 2, §12.25, §12.68
- Power limit §12.131
- Power supply requirements §12.132
- Proof of citizenship discontinued 5, Order 75-D
-
- Questions and answers, typical:
 - Class A 17-27
 - Class B-C 10-11
- Quiet hours §12.152
-
- Radio control §12.101
- Radiotelephony:
 - Bands for §12.115, §12.116, §12.117
 - Carrier modulation required §12.134
 - Modulation percentage §12.133
 - Music prohibited §12.104
 - Sideband frequency limits §12.113
 - Tests §12.104
- Rebroadcasting §12.103
- Remote control 3, §12.64
- Renewals:
 - Filing applications 6, §12.27, §12.67, Order 130-F
 - Operator licenses 6, §12.27
- Revocation of station license §12.69
-
- Secrecy of communications Act Sec. 605
- Sideband frequency limits §12.113
- Signing §12.82
- Signing logs §12.136 (b)
- Spurious radiations, prevention of §12.133
- Stability of signals §12.133
- Station licenses:
 - Application for §12.63
 - Availability of §12.68
 - Eligibility for 1, §12.61
 - Extension of Order 130-F
 - Renewal of 9, §12.67, Order 130-F
 - Term 2, §12.65
- Suspension of operator license §12.30, §12.31
-
- Temporary changes 9
- Temporary FCC orders 29-31
- Temporary location of fixed station §12.93 (b)
- Term of license 5, §12.29, §12.65
- Types of emission 28 (footnote)
-
- Unlicensed persons, transmissions by §12.28, §12.136 (b)
- Unmodulated carrier prohibited §12.134
- Use of stations §12.101-12.104
-
- Violations:
 - Answers to notices §12.155
 - Second notice §12.153
 - Third notice §12.154



NATIONAL PARTS FOR YOUR RIG

NATIONAL PARTS are back again after a distinguished wartime service. You will find nearly everything it takes to make a fine amateur station within the pages of the National Catalogue. Some time-tested units will need no introduction, for they have served amateurs faithfully for many years. Others are brand new, like the HX-100 socket which takes all tubes having the Giant 5-pin base, including Eimac 4-125-A's and 4-250-A's. The little XLA socket, born of military necessity, brings new reliability and better performance to acorn tubes at frequencies up to 600 MC.

Take a look at the National Catalogue. It shows parts you need, built the way you like them and designed to make the best of all hobbies more fun than ever.



NATIONAL COMPANY, INC.

MALDEN, MASSACHUSETTS, U.S.A.

MALDEN
MELROSE
★★★★





Newcomers and Veteran Hams
alike look to

HARVEY

for everything from a code practice set to a complete station

HARVEY has a complete staff of licensed amateurs who understand your problems and can help you with technically sound recommendations.

HARVEY invites your patronage. Whether you purchase a half-watt resistor or a 1 KW transmitter, you may be sure of the same courteous attention and technical assistance.

If you cannot visit our conveniently located headquarters at 103 West 43rd St., New York City (one block east of Times Square), to see long-promised postwar products...

WRITE . . . WIRE . . . OR PHONE . . .

HARVEY

- **Orders filled promptly!**
- **Sound technical advice, upon request!**
- **Prompt deliveries anywhere in the U. S. A.!**



**SOME OF THE
MANUFACTURERS
WHOSE PRODUCTS
WE DISTRIBUTE**

ABBOTT INSTRUMENT, INC.
AEROVOX CORPORATION
ALLIANCE MANUFACTURING CO.
ALTEC LANSING
AMERICAN PHENOLIC CORP.
AMERICAN RADIO HARDWARE CO.
AMERICAN TELEVISION & RADIO CO.
AMPERITE COMPANY
AMPEREX ELECTRONIC CORPORATION
ASTATIC MICROPHONE LABORATORY
ATLAS SOUND CORP.
AUDAK COMPANY
AUDIO DEVICES CO.

BARKER & WILLIAMSON
BELDEN MFG. CO.
BIRNBACH RADIO CO.
BLILEY ELECTRIC CO.
BOGEN COMPANY, DAVID
BRUSH DEVELOPMENT CO
BUD RADIO COMPANY

CARDWELL MFG. CO.
CENTRALAB
CLAROSTAT
CORNELL-DUBILIER
CORNING GLASS WORKS
COTO COIL

DAVEN ATTENUATORS
DIAL PLATES
DRAKE ELECTRIC WORKS
DUMONT LABORATORIES, INC., ALLEN B.

EASTERN MIKE-STAND CO.
EBY CO., HUGH H.
EITEL McCULLOUGH (EIMAC)
ELECTRONIC LABORATORIES

GENERAL INDUSTRIES CO.
GORDON SPECIALTIES CO.

HALLICRAFTERS, INC.
HAMMARLUND MFG. CO.
HEINZ-KAUFMAN (GAMMATRON)
HICKOCK ELECTRIC
HYTRON CORPORATION

INSULINE CORP. (ICA)
INTERNATIONAL RESISTANCE CO. (IRC)

JANETTE MFG. CO.
JENSEN RADIO MFG. CO.
JOHNSON CO., E. F.
JONES, HOWARD B.

KENYON TRANSFORMER CO
KRAEUTER & CO., INC.

LENZ ELECTRIC MFG. CO.
LITTELFUSE LABORATORIES

MEISSNER MFG. CO.
MILLEN MFG. CO.
MILLER CO., J. W.
MUELLER ELECTRIC CO.

NATIONAL COMPANY
NATIONAL UNION RADIO CORPORATION

OHMITE MFG. CO.

PAR-METAL PRODUCTS CORP.
PHILCO
PIONEER GENEMOTOR CORP.
PRECISION APPARATUS CO.
PRESTO RECORDING CORP.

RADIO MFG. ENGINEERS (RME)
RAYTHEON PRODUCTION CORP.
RCA MANUFACTURING CO.

SANGAMO ELECTRIC CO.
SHURE BROTHERS
SIGNAL ELECTRIC MFG. CO.
SIMPSON ELECTRIC MFG. CO.
STANDARD ELECTRIC PRODUCTS CO.
(STACO)
STANDARD-TRANSFORMER CORP.
(STANCOR)
STROMBERG-CARLSON
STRUTHERS DUNN, INC. (DUNCO)
SUPREME INSTRUMENTS CORP.

TAYLOR TUBES, INC.
THORDARSON ELECTRIC MFG. CO.
TRIMM HEADPHONES
TRIPLETT ELECTR. INSTRUMENT CO.
TURNER COMPANY

UNITED TRANSFORMER CO. (UTC)
UNIVERSITY LABORATORIES
UTAH RADIO PRODUCTS CO.

WARD-LEONARD ELECTRIC CO.
WESTON ELECTR. INSTRUMENT CO.
WORNER PRODUCTS CO.

NEED HAM GEAR?

NEWARK

HAS IT

WHETHER you are a newly-licensed amateur, ready for that first QSO, or a regular "ol" graybeard who's been riding the airwaves for years, you can get the latest and best in radio at Newark Electric.

Newark's three big, conveniently-located stores are "loaded" with famous name receiving sets, transmitters, batteries, tubes, condensers, transformers, headsets, rheostats and meters — plus amazing bargains in government surplus equipment.

You'll find, also, that our experienced salespeople are helpful and courteous, and interested in your problems because they talk your language. Make Newark Electric the headquarters for all your ham gear requirements.

Newark Electric's own "hams" will be happy to assist you in getting started in amateur radio, placing at your disposal their years of practical experience in this exciting field.

To keep up with what's new, send us your name and address and we will put you on the mailing list for *Newark's famous monthly bargain sheet*, as well as our new, big catalog when printed. Write a Newark store in New York or Chicago. (Address New York mail to 45th Street branch.)

- BIG STOCKS
- FAST SERVICE
- EXPERIENCE
- UNDERSTANDING



SINCE 1925



HEADQUARTERS FOR HAMS

(AND BEGINNERS, TOO!)

Factory
Distributors
of

ABBOTT
ADVANCE
AEROVOX
ALADDIN
ALLIANCE
ALPHA
AMERICAN
AMPHENOL
AHRCO
ARRL
ATR
AMPEREX
AMPERITE
ASTATIC
ATLAS
B & W
BELDEN
BELL
BIRNBACH
BLILEY
BOGEN
BRUSH
BUD
BURGESS
CARDWELL
CENTRALAB
CINAUDAGRAPH
CONTINENTAL
CORNELL
CROWE
DRAKE
DUMONT
DUNCO
ECHOPHONE
EIMAC
ESICO
ELECTRONIC
ERIE
GAMMATRON
GC
GE
GENERAL
GUARDIAN
HALLICTAFTERS
HAMMARLUND
HICKOK
HOWARD
ICA
IRC
JACKSON



YES—for more than twenty years Amateurs in all parts of the world have relied on us for all their equipment. As authorized Factory Distributors for all leading manufacturers, we carry only the best and the newest Receivers, Transmitters, Parts, etc.

Our years of experience, our tremendous stock, and, above all, our sincere desire to render friendly and helpful service make Harrison your most satisfactory source for all your requirements.

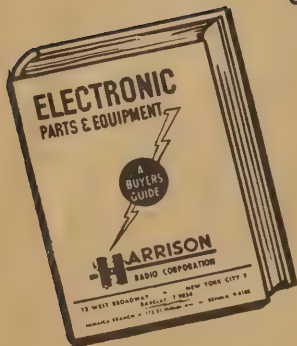
Your orders are welcomed. They will be quickly filled at the very lowest Amateur prices.

May we serve you?

73 de

BILL HARRISON, W2AVA

A postcard will put you on the list to receive mailings of "Harrison Has It"—our bulletins of New Items, Hard-to-get Gear, and HSS (Harrison Select Surplus) — those famous money-saving values! Send it now.



Do you have "Electronic Parts and Equipment"—the NEW 800 page Buyers Guide? You can obtain one — write today for details.

JANETTE
JENSEN
JOHNSON
JONES
KENYON
KRAEUTER
LECTROHM
LITTELFUSE
MEISSNER
MILLEN
MILLER
MUELLER
NATIONAL
OHMITE
PARMETAL
PIONEER

PRECISION
PREMAX
PRESTO
PYREX
RADIART
RCP
RME
RAYTHEON
RCA
SANGAMO
SHURE
SIGNAL
SIMPSON
SPEED-X
SPRAGUE
STANCOR

SUPREME
SYLVANIA
TAYLOR
THORDARSON
TRIMM
TRIPLETT
TURNER
UNITED
UTC
UNIVERSAL
UNIVERSITY
UTAH
VIBROPLEX
WARD LEONARD
WESTINGHOUSE
WESTON

HARRISON RADIO CORPORATION

12 WEST BROADWAY • NEW YORK CITY 7
BARCLAY 7-9854

JAMAICA BRANCH — 172-31 Hillside Ave. — REPUBLIC 9-4102

Get Acquainted with the Radio Shack

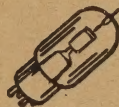
RECEIVERS



TRANSMITTERS



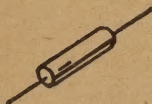
TUBES & SOCKETS



CAPACITORS



RESISTORS



TRANSFORMERS



CRYSTALS



SPEAKERS



KEYS & RELAYS



When you need radio gear of any kind — from the simple parts used in your first experimental hookups to the finest receivers and the high-powered transmitter you'll want after you've had your ham ticket for a while—you can depend on the Radio Shack to take care of *all* your needs. We've been doing it since 1922 for amateurs and experimenters the world over, and we're sure *you'll* enjoy our friendly service.

Receivers, parts, tools, test instruments, books, transmitters . . . everything needful for your enjoyment of amateur radio is ready for you in our ample stocks of nationally famous radio brands. Service is speedy, too . . . mail orders are dispatched promptly to amateurs at the four corners of the globe. And, so you won't have to delay getting on the air, we have a convenient time-payment plan we'll tell you all about if you need this helping hand.

So when you're fitting up *your* ham shack, don't delay . . . get acquainted with the Radio Shack today!

Free—108 page catalog of amateur radio gear. Write for your copy today; ask for catalog number 47-M.

The **RADIO
SHACK**

★ 167 WASHINGTON ST.
BOSTON, MASS.. U.S.A. ★

FAST...EFFICIENT...CENTRALIZED SERVICE

at **ALLIED** *Everything in* **RADIO**

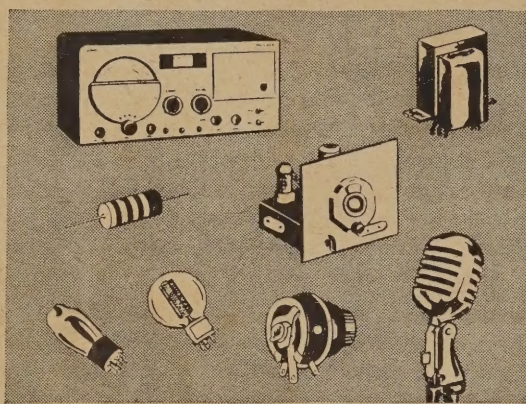
FOR THE

HAM



FOR THE BEGINNER

For years, Allied has encouraged and helped thousands of beginners to become licensed radio amateurs. Specialists on our staff are experienced in radio training. From our large stocks you can get everything you need . . . Transceiver, Transmitter and Oscillator Kits, Code Equipment, Books, etc. We also have a complete Parts List Service for any kit in the ARRL Handbook.



FOR THE VETERAN AMATEUR

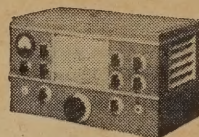
Whether you plan to rebuild that old rig and "get back on the air" . . . or want to try a new Ham band in the U.H.F.—you can get faster delivery from Allied on the latest available components and equipment—and you are certain of guaranteed quality at the lowest prices. Our experienced staff of licensed radio amateurs is always ready to assist you in every way.

LARGEST AND MOST COMPLETE STOCKS UNDER ONE ROOF!

Allied is a leader in the distribution of Communications equipment. Ready here for rush delivery are the largest and most complete stocks under one roof . . . nationally known quality products . . . available at lowest prices, and fully guaranteed. Save time, work and money. Get everything you need from this one dependable, central source. You are sure of fast, efficient, conscientious service.

For Earliest Delivery... Order Your New COMMUNICATIONS RECEIVER Now from **ALLIED**

Available on Time Payments • Trade-ins Accepted



| | | |
|--------------------------------------|--------------------------------|----------|
| | RME VHF-152 Converter. | \$ 86.60 |
| | Hammarlund HQ-129X. | 129.00 |
| | National NC-2-40C. | 225.00 |
| | National HRO. | 197.70 |
| | Hallicrafters SX-28A. | 223.00 |
| | Hallicrafters S-36A. | 307.50 |
| Hallicrafters S-40. | \$ 79.50 | |
| SM-40 External "S" Meter. | 15.00 | |
| Hammarlund 400X. | 318.00 | |
| Hammarlund 400SX. | 318.00 | |
| Hallicrafters SX-25. | 94.50 | |
| Hallicrafters S-37. | 591.75 | |
| RME-45. | 186.00 | |
| Hallicrafters BC-610 (HT-4). | 500.00 | |
| RME DB-20. | 59.30 | |
| Hallicrafters HT-9. | 225.00 | |

Net F.O.B. Chicago. Prices Subject to Possible Change

Send Now for Your
NEW 1946

Radio Parts and Equipment

CATALOG

Free



Today's handiest, most complete Buying Guide. Includes latest communications receivers, parts, kits, tubes, tools, books, test instruments, public address and other equipment. Places everything you need right at your finger tips—brings you the finest values in Radio.

ALLIED RADIO

833 W. Jackson Blvd., Dept. 69-6, Chicago 7, Ill.

Everything in Radio and Electronics

U. S. RADIO DISTRICTS

| <i>District</i> | <i>Territory</i> | <i>Address, Radio Inspector-in-Charge</i> |
|-----------------|---|--|
| No. 1 | The States of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. | Customhouse, Boston, Mass. |
| No. 2 | The counties of Albany, Bronx, Columbia, Delaware, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Schenectady, Suffolk, Sullivan, Ulster and Westchester of the State of New York; and the counties of Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union and Warren of the State of New Jersey. | 748 Federal Bldg., 641 Washington St., New York, N. Y. |
| No. 3 | The counties of Adams, Berks, Bucks, Carbon, Chester, Cumberland, Dauphin, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Perry, Philadelphia, Schuylkill and York of the State of Pennsylvania; and the counties of Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Ocean and Salem of the State of New Jersey; and the county of Newcastle of the State of Delaware. | 1200 Customhouse, Second and Chestnut Sts., Philadelphia, Pa. |
| No. 4 | The State of Maryland; the District of Columbia; the counties of Arlington, Clark, Fairfax, Fauquier, Frederick, Loudoun, Page, Prince William, Rappahannock, Shenandoah and Warren of the State of Virginia; and the counties of Kent and Sussex of the State of Delaware. | 508 Old Town Bank Bldg., Baltimore, Md. |
| No. 5 | The State of Virginia except that part lying in District 4, and the State of North Carolina except that part lying in District 6. | 402 New Post Office Bldg., Norfolk, Va. |
| No. 6 | The States of Georgia, South Carolina, and Tennessee; and the counties of Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Cleveland, Graham, Haywood, Henderson, Jackson, McDowell, Macon, Madison, Mitchell, Polk, Rutherford, Swain, Transylvania, Watauga and Yancey of the State of North Carolina; and the State of Alabama except that part lying in District 8. | 411 Federal Annex, Atlanta, Ga. |
| No. 7 | The State of Florida, except that part lying in District 8. | 312 Federal Bldg., Miami, Fla. |
| No. 8 | The States of Arkansas, Louisiana and Mississippi; and the city of Texarkana in the State of Texas; the county of Escambia in the State of Florida; the counties of Mobile and Baldwin in the State of Alabama. | 400 Audubon Bldg., New Orleans, La. |
| No. 9 | The counties of Aransas, Brazoria, Brooks, Calhoun, Cameron, Chambers, Fort Bend, Galveston, Goliad, Harris, Hidalgo, Jackson, Jefferson, Jim Wells, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, Victoria, Wharton and Willacy of the State of Texas. | 404 Post Office Bldg., Galveston, Tex. |
| No. 10 | The State of Texas except that part lying in District 9 and in the city of Texarkana; and the States of Oklahoma and New Mexico. | 500 U. S. Terminal Annex Bldg., Dallas, Tex. |
| No. 11 | The State of Arizona; the county of Clarke in the State of Nevada; and the counties of Imperial, Inyo, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara and Ventura of the State of California. | 539 U. S. Post Office & Courthouse Bldg., Los Angeles, Calif. |
| No. 12 | The State of California except that part lying in District 11; the State of Nevada except the county of Clarke. | 328 Customhouse, San Francisco, Calif. |
| No. 13 | The State of Oregon; and the State of Idaho except that part lying in District 14; and the counties of Wahkiakum, Cowlitz, Clark, Skamania and Klickitat of the State of Washington. | 805 Terminal Sales Bldg., 1220 S. W. Morrison St., Portland, Ore. |
| No. 14 | The State of Montana; the State of Washington except that part lying in District 13; and the counties of Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce and Shoshone of the State of Idaho. | 808 Federal Office Building, Seattle, Wash. |
| No. 15 | The States of Colorado, Utah and Wyoming. | 504 Customhouse, Denver, Colo. |
| No. 16 | The States of North Dakota, South Dakota and Minnesota; the counties of Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon and Schoolcraft of the State of Michigan; and the State of Wisconsin except that part lying in District 18. | 208 Uptown P. O. & Federal Courts Bldg., St. Paul, Minn. |
| No. 17 | The States of Nebraska, Kansas and Missouri; and the State of Iowa except that part lying in District 18. | 809 U. S. Courthouse, Kansas City, Mo. |
| No. 18 | The States of Indiana and Illinois; the counties of Allamakee, Buchanan, Cedar, Clayton, Clinton, Delaware, Des Moines, Dubuque, Fayette, Henry, Jackson, Johnson, Jones, Lee, Linn, Louisa, Muscatine, Scott, Washington and Winneshiek of the State of Iowa; the counties of Columbia, Crawford, Dane, Dodge, Grant, Green, Iowa, Jefferson, Kenosha, Lafayette, Milwaukee, Ozaukee, Racine, Richland, Rock, Sauk, Walworth, Washington and Waukesha of the State of Wisconsin. | 246 U. S. Courthouse Bldg., Chicago, Ill. 826 vs --- --- an 4, 26 |
| No. 19 | The State of Michigan except that part lying in District 16; the States of Ohio, Kentucky and West Virginia. | 1029 New Federal Bldg., Detroit, Mich. |
| No. 20 | The State of New York except that part lying in District 2; and the State of Pennsylvania except that part lying in District 3. | 328 Federal Building, Buffalo, N. Y. |
| No. 21 | The Territory of Hawaii, Guam, Wake, Midway, Am. Samoa. | 609 Stangenwald Bldg., Honolulu, T.H. |
| No. 22 | Puerto Rico and the Virgin Ids. | 322 Federal Bldg., San Juan, P. R. |
| No. 23 | The Territory of Alaska. | 7 Shattuck Bldg., Juneau. |

Other Publications BY THE AMERICAN RADIO RELAY LEAGUE

QST

¶ The Official Magazine of the American Radio Relay League *QST* faithfully and adequately reports each month the rapid development which makes Amateur Radio so intriguing. Edited in the sole interests of the members of The American Radio Relay League, who are its owners, *QST* treats of equipment and practices and construction and design, and the romance which is part of Amateur Radio, in a direct and analytical style which has made *QST* famous all over the world. It is essential to the well-being of any radio amateur. *QST* goes to every member of The American Radio Relay League and membership costs \$2.50 per year in the United States and Possessions. All other countries \$3.00 per year.

THE RADIO AMATEUR'S HANDBOOK

¶ "*The all-purpose volume on radio.*" Text, data book, operating manual — it is all these and more. As a text it is probably more used in radio schools and colleges than any other single volume. As a practical constructional handbook, it stands in a class alone. As an operating manual, it provides information available from no comparable source.

STANDARD EDITION

The latest edition of The Radio Amateur's Handbook is postwar in content, containing 688 pages of the kind of material which has made The Handbook world famous. With the suddenness of peace it meant much redoing of the Handbook but this was done. Retained is the highly successful treatment of fundamentals which was an innovation of the 1942 edition. Stripped to essentials, the theory and design sections cover every subject encountered in practical radio communication, sectionalized by topics with abundant cross-referencing and fully indexed. An ideal reference work, this Edition also contains all the constructional information on tested and proved gear which has always been the outstanding feature of the HANDBOOK. \$1 postpaid in Continental U. S. A. \$1.50 postpaid elsewhere. Buckram Bound, \$2.50.

THE RADIO AMATEUR'S LICENSE MANUAL

¶ To obtain an amateur operator's license you must pass a government examination. The License Manual tells how to do that — tells what you must do and how to do it. It makes a simple and comparatively easy task of what otherwise might seem difficult. In addition to a large amount of general information, it contains questions and answers such as are asked in the government examinations. If you know the answers to the questions in this book, you can pass the examination without trouble. Price 25¢

THE A.R.R.L. ANTENNA BOOK

¶ A comprehensive manual of antenna design and construction, by the headquarters staff of the American Radio Relay League. Eighteen chapters, profusely illustrated. Both the theory and the practice of all types of antennas used by the amateur, from simple doublets to multi-element rotaries, including long wires, rhomboids, vees, phased systems, v.h.f. systems, etc. Feed systems and their adjustment. Construction of masts, lines and rotating mechanisms. The most comprehensive and reliable information ever published on the subject. Price 50¢

HINTS AND KINKS

¶ Amateurs are noted for their ingenuity in overcoming by clever means the minor and major obstacles they meet in their pursuit of their chosen hobby. An amateur must be resourceful and a good tinkerer. He must be able to make a small amount of money do a great deal for him. He must frequently be able to utilize the contents of the junk box rather than buy new equipment. Hints and Kinks is a compilation of hundreds of good ideas which amateurs have found helpful. It will return its cost many times in money savings — and will save hours of time. Price 50¢

HOW TO BECOME A RADIO AMATEUR

LIGHTNING CALCULATORS

¶ This publication is recognized as the standard elementary guide for the prospective radio amateur. Price 25¢

¶ Circular slide rules, on 8½ x 11-in. bases, of special cardboard, with satisfactory accuracy. *Two types:* Type A solves problems in frequency, wavelength, inductance and capacity. Price \$1. Type B makes computations involving voltage, current and resistance. Price \$1.

THE AMERICAN RADIO RELAY LEAGUE, INC.

WEST HARTFORD, CONNECTICUT